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ASSESSMENT OF NUTRITIONAL STATUS OF BLIND AND DEAF SCHOOL CHILDREN AND ADOLESCENTS IN THE EASTERN REGION OF GHANA

BY

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DECLARATION

I, Apungu Francis Kwotua, declare that this work is purely my own effort, it has not been submitted either in part or whole elsewhere and all references have been duly acknowledged.

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CANDIDATE

SIGNATURE: …….... …….. ……....

PROF. KWASI TORPEY DATE

SUPERVISOR

DEDICATION

This work is dedicated to my loving daughter Blessing Awedaga Apungu.

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ABSTRACT

Background: Malnutrition and disability are inter-related, preventable global developmental and human right priorities (Groce *et al*., 2014). Globally, about 19% of people have a disability (UN, 2015). Studies have established a high malnutrition rate among the disabled (Hume-nixon & Kuper, 2018; Reinehr, Dobe, Winkel, Schaefer, & Hoffmann, 2010). Micronutrients deficiencies such as iodine, iron, and vitamin A deficiencies cause several disabilities including blindness and deafness which could predispose the individual to a vicious cycle of disability, malnutrition, and poverty (Bailey, West, & Black, 2015; Department for International Development, 2000; Kerac *et al*., 2014). The study sought to determine the nutritional status (BMI-for-age and height-for-age) of blind and deaf school children and adolescents and the association of socio-demographic characteristics with nutritional status.

Method: A cross-sectional study design was used to determine the nutritional status of blind and deaf students within the age group 5-19years. Three schools in the Eastern Region of Ghana were selected purposively and 313 blind and deaf students selected with a simple random sampling method. A structured pre-tested questionnaire was used to collect anthropometric and socio-demographic data of the students.

Results: The prevalence of stunting (height for age <-2SD), thinness (BMI for age <-2SD), and overweight/obese (BMI for age >1SD) in both blind and deaf students (5-19years) was 17.6%, 7.3% and 8.7% respectively. The study found that the blind students had a prevalence of thinness, stunting and overweight/obese of 7.7%, 19.6%, and 14.7% respectively, whiles the deaf students had a prevalence of thinness, stunting and overweight/obese of 7.1% 15.9% and 3.5% respectively.

Both disabilities (blind and deaf) had a high prevalence rate of stunting (16.9%), thinness (7.3%) and overweight/obese (6.4%) within the age group 10-19years. Disability type (blind and deaf) (p=0.002) and practiced of trimmed fingernails of students (p=0.005) were significantly associated with BMI-for-age but not with height-for-age. Age of students was also significantly associated with BMI-for-age (p=0.029).

Conclusion: The study found the prevalence of stunting, thinness, and overweight/obese in both blind and deaf students (5-19years) as 17.6%, 7.3%, and 8.7% respectively. The blind students within the age group 10-19year had higher malnutrition rate (thinness and overweight/obese) as compared to the deaf students. The nutritional status (BMI-for-age) of the disabled children and adolescents was significantly associated with age, disability type, and hygiene practice of trimming of fingernails.

Keywords: Nutritional status, Stunting, Thinness, Disability, Blind, and Deaf.

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LIST OF ABBREVIATIONS

ACPF	African Child Policy Forum
AOR	Adjusted Odds Ratio
BMI	Body Mass Index
CDC	Centre for Disease Control
COR	Crude Odd Ratio
DALY	Disability-Adjusted Life Year
DFID	Department for International Development
GBD	Global Burden of Disease
GDHS	Ghana Demographic Health Service
GSS	Ghana Statistical Service
JHS	Junior High School
KG	Kindergarten
SDGs	Sustainable Development Goals
SHS	Senior High School
UNICEF	United Nation International Children Education Fund
WHO	World Health Organization

DEFINITION OF TERMS

Disabilities- Is defined as a limitation in the functional domain that arises from the interaction with various barriers that may hinder full and effective participation in society on an equal basis with others (UN, 2015).

Blind -This refers to children and adolescents who cannot see or have no sense of sight (WHO, 2013).

Deaf -This refers to children and adolescents who cannot speak an oral language (WHO, 2016).

Nutritional status-The state of the body or health of an individual that is influenced by the intake and utilization of nutrients. The nutritional markers include height-for-age and BMI-for- age of the children and adolescents.

Stunting-Low height for age (<-2SD). This refers to the inability to reach linear growth potentials. Stunting indicates chronic undernutrition.

Thinness- Low BMI for age (<-2SD). This refers to the low body mass index (weight (kg) per height squared (m2)) relative to chronological age. Thinness indicates acute undernutrition (Cogill, 2003; WHO, 2010).

School children and adolescents-This refers to children and adolescents aged 5-19years attending school.

CHAPTER ONE

1.0 INTRODUCTION

Malnutrition affects one in three people worldwide (WHO, 2016). In 2017, the global prevalence of wasting and stunting in children under 5 years in Africa was 27% and 39% respectively (UNICEF/WHO/World Bank Group, 2018). The prevalence of stunting among children under age 5years in Ghana and the Eastern Region were 19% and 17% respectively (Ghana Demographic Health Survey, 2014). Studies of nutritional status of school children and adolescents in Ghana showed a high prevalence of thinness (34.6%) (Owusu, Colecraft, Aryeetey, Vaccaro, & Huffman, 2017) and stunting (52.2%) (Danquah, Amoah, Steiner-Asiedu, & Opare-Obisaw, 2012).

Disability refers to a limitation in the functional domain that arises from the interaction with various barriers that may hinder full and effective participation in society on an equal basis with others (UN, 2015). Disabilities include impairments such as hearing impairment, paralysis or blindness, activity limitations, and participation restrictions (WHO, 2011). The global disability prevalence in 2015 was 19% (UN, 2015). Majority of people with disabilities (80%) live in developing countries and the high prevalence of disabilities in these countries are linked with poverty (WHO, 2011). According to the Ghana statistical service, persons with disability account for 3% of the total population. The most prevalent disability is visual impairment (40.1%) and is followed by physical challenges (25.4%), emotional/behavioural problems (18.6%), intellectual malfunctioning (15.2%), and hearing impairment (15.0%) (Ghana Statistical Service, 2010).

Malnutrition and disability are inter-related, global development and human right priorities within the global health agenda (Groce *et al*., 2014). Studies have shown a significant association between disability and malnutrition (Gottlieb, Maenner, Cappa, & Durkin, 2005). Malnutrition could cause disability and it could predispose the individual to malnutrition (Kerac *et al.*, 2014). Micronutrients deficiencies such as iodine, iron, and vitamin A deficiencies cause several disabilities including blindness and deafness which could predispose the individual to a vicious cycle of disability, malnutrition, and poverty (Bailey, West, & Black, 2015; Department for International Development, 2000; Kerac *et al*., 2014). A disability could lead to a reduction in food intake, increase nutrient loss and increase nutrient demand or need poverty (Groce, Challenger, Kerac, & Cheshire, 2013; Kuper, Nyapera, Evans, & Munyendo, 2015).

According to the United Nation 2015 report on disability, children, adolescents, and adults with disabilities often do not benefit from the same level of health, nutritional and social welfare services, as the non-disabled population (UN, 2015). This makes them more vulnerable to nutritional and health disorders. The nutritional and health status of children and adolescent is greatly influenced by economic factors or income levels of their family, social factors, demographic characteristics, and environmental factors (Omondi & Kirabira, 2016; Quansah, Ohene, Norman, Mireku, & Karikari, 2016). Studies have identified a vicious cycle of poverty and disability. Poverty apart from causing disability can also lead to negative secondary effect for the already disabled. Families' spent money and time and in caring for the special needs of these children instead of (Department for International Development, 2000; Kuhlthau & Perrin, 2001a; Pinilla-Roncancio, 2015).

Undernutrition and overnutrition are a problem in low and middle-income countries (Black *et al.*, 2013). Studies have shown a high prevalence of undernutrition and overnutrition among disabled children and adolescents (Abdallah, El-Sherbeny, & Khairy, 2007; Nachvak, Ahani Kamangar, Nemati, Abbagolizadeh, & Malekzadeh, 2016; Vélez *et al*., 2008). A systematic review showed that children and adolescents with disabilities were three times at risk of underweight and nearly two times at risk of wasting and stunting in low and middle-income countries (Hume-nixon & Kuper, 2018). Another study showed that the prevalence of overweight and obesity among disabled children was almost twice that of those without disabilities (Reinehr *et al*., 2010).

Findings of studies on nutrition and health status of children and adolescent with disabilities provide support for decision making, legislation and the inclusion of disability in the national agenda (Tomlinson *et al.*, 2009). Undertaking research that provides information for improving the nutrition and well-being of children and adolescent with disabilities should be a priority toward achieving the Sustainable Development Goals. However, there are limited studies on the nutritional status of the disabled in Ghana. This study, therefore, sought to determine the prevalence of thinness and stunting among blind and deaf school children and adolescent in three selected schools in the Eastern Region of Ghana and to examine the association of socio-demographic factors with nutritional status.

1.1 PROBLEM STATEMENT

The World Health Organisation (WHO) reported in 2016 that, 159 million, 50 million and 41 million children under 5years were stunted, wasted and overweight respectively out of the 667 million children globally (WHO, 2016). In 2017, the global prevalence of wasting and stunting in children under 5 years in Africa was 27% and 39% respectively (UNICEF/WHO/World Bank

Group, 2018). The 2014 Ghana Demographic Health Survey (GDHS) reported 19%, 5%, and 11% as the prevalence of stunting, wasting and underweight respectively. Malnutrition rate for children under age 5years in the Eastern Region were 3.2%, 17% and 7.9% for wasting, stunting and underweight respectively (Ghana Demographic Health Survey, 2014). A study in Ghana involving children and adolescents found the prevalence of thinness and stunting as 34.6% and 48.4 respectively (Owusu *et al*., 2017). The global disability prevalence in 2015 was 19%. However, the prevalence of disability in children and adolescents (0-14years) was 5% (UN, 2015). According to the 2017 global report, 34 million children have a hearing impairment (WHO, 2018) whilst 13 million children have visual impairment (WHO, 2006). However, in Ghana persons with disability account for 3% of the total population. Visual impairment, hearing and speech disabilities were 40.1%, 15%, and 13.4% respectively. Eastern Region was the fourth highest in Ghana with a disability population of 3.6%. Children, adolescents, and adults within the age groups 0-14years and 15-24years have disability rates of 15.4% and 11.9% respectively (Ghana Statistical Service, 2010).

Malnutrition incidence is higher among children with disabilities than those without disabilities (Abdallah *et al*., 2007; Reinehr *et al*., 2010). A Study showed that children with disabilities were three times at risk of underweight than non-disabled children (Tüzün, Güven, Eker, Elbasan, & Bülbül, 2013). Similar studies showed the prevalence of overweight and obesity among disabled children was almost twice that of those without disabilities (Reinehr *et al*., 2010). The causes of malnutrition among the disabled are usually due to decreased nutrient intake, increased nutrient loss and increased body requirements of nutrient. Inadequate health services, socio-cultural practices, poor hygiene and sanitation, low-income distribution and education are major determinants of malnutrition (UNICEF, 2015).

The causes of disabilities include injuries/accidental, illness/infection and/or congenital disorders. A disability could be caused by a deficiency of micro or macronutrients and exposures to excess amounts of anti-nutrients or toxin in food (Groce, Challenger, Kerac, & Cheshire, 2013). Most disabled-associated ill health and wasting are usually connected with the feeding problem (Penagini *et al*., 2015). Measles, malaria, and vitamin A deficiency increased blindness prevalence of children (Yorston & Naughton, 2004). Studies have shown that cognitive damage is a result of iodine deficiency (Bleichrodt & Born, 1996; Pearce, Lazarus, Moreno-reyes, & Zimmermann, 2016; UNICEF, 2013; WHO, 2004). Drinking from the unsafe water source could lead to disabilities such as river blindness (ACPF, 2014). Common causes of hearing loss include infectious causes, cryptogenic deafness, and middle ear disease (Mulwafu, Kuper, & Ensink, 2016). Malnutrition among the disabled children and adolescents predisposes them to increase the risk of morbidity, and mortality as compared to those without disabilities. According to the 2014 Ghana Demographic Health Survey (GDHS), the under 5 mortality rates was 60 deaths per 1,000 live birth (Ghana Demographic Health Survey, 2014). Most of the under-five mortalities are due to malnutrition, disability or both. Children and adolescents with disabilities are less likely to fulfill their educational potentials. They are more vulnerable to illness and poverty (Kuper *et al*., 2014).

Although the knowledge nutritional and health status of the disabled is a priority on the global health agenda, there are inadequate studies on the nutrition status of children and adolescents with disabilities in the Eastern Region of Ghana which has a high prevalence of disability. This study, therefore, sought to assess the nutritional status (BMI for age and height for age) of blind and deaf children and adolescent with disabilities and to determine the socio-demographic characteristics associated with their nutritional status.

1.2 CONCEPTUAL FRAMEWORK OF THE NUTRITIONAL STATUS OF THE DISABLED.

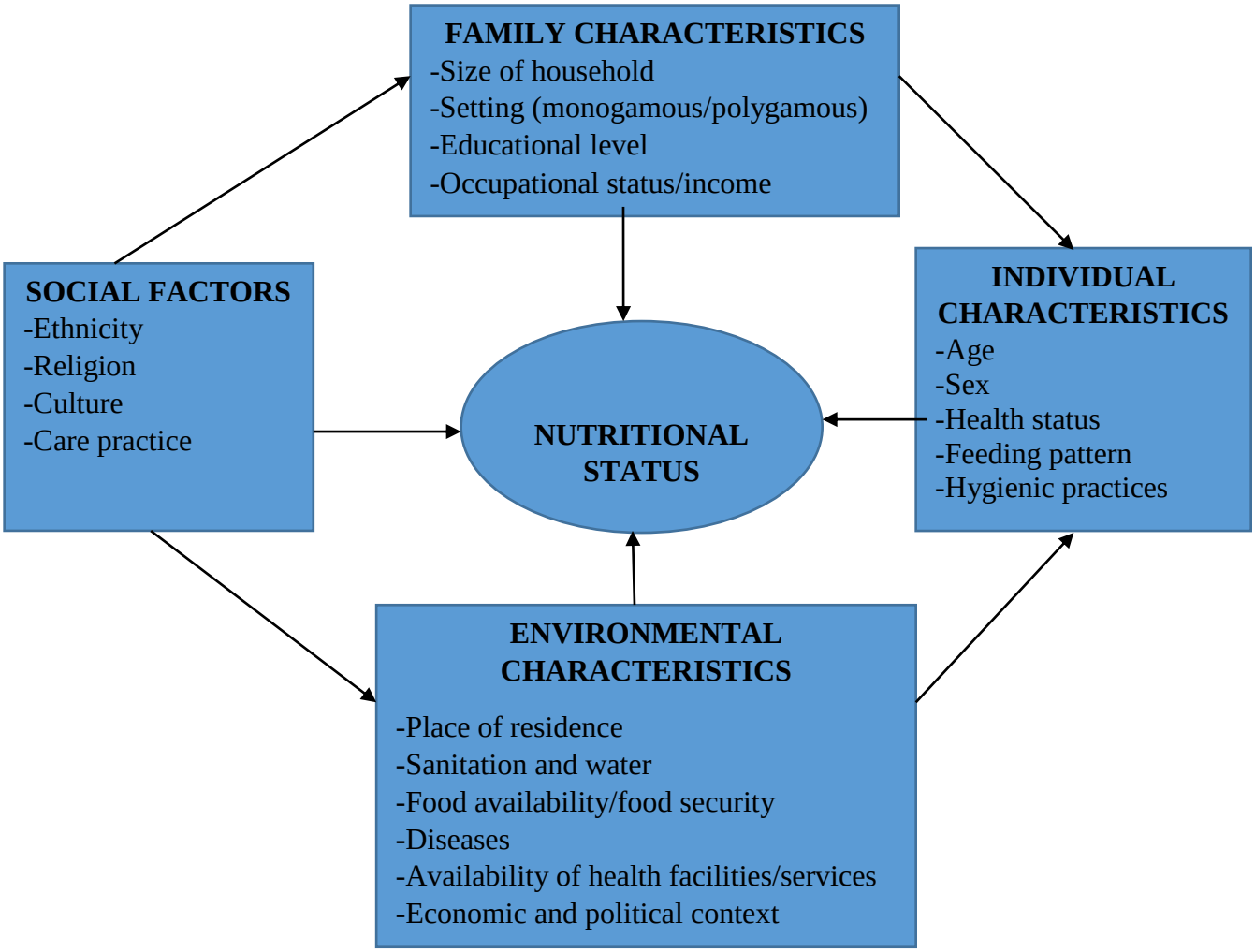

Figure 1: Conceptual framework of the nutritional status of the disabled

Adopted from UNICEF conceptual framework (UNICEF, 1998)

In reality, different factors interact with each other to affect the risk of disability and malnutrition. According to the UNICEF conceptual framework of malnutrition, the nutritional status of an individual is influenced by immediate, underlying and basic factors (UNICEF, 1998). Figure 1

shows the conceptual framework of nutritional status modified from the UNICEF conceptual framework of malnutrition. Nutritional status of children and adolescents with disabilities is directly influenced by social factors (e.g. ethnicity and religion), family characteristics (e.g. size of household and setting, parental educational level, and occupational status), and individual characteristics (e.g. age, sex, health status, feeding pattern, and hygienic practices) and environmental characteristics (e.g. place of residence, school environment, sanitation, and food water and availability). Studies have shown a significant association between place of residence, family size and nutritional status (Mikki, Abdul-Rahim, Awartani, & Holmboe-Ottesen, 2009; Shi *et al*., 2005). Similar studies showed nutrition status influenced by the sex of children, mother's educational status, socio-economic status and family settings (Dapi, Janlert, Nouedoui, Stenlund, & Håglin, 2009; Joshi, Upadhyay, & Singh, 2016; Melaku, Zello, Gill, Adams, & Shi, 2015). A study in Kenya showed a significant association of age of mother, income and mother education with the nutritional status of children (Omondi & Kirabira, 2016). Improved water sanitation and hygiene reduce enteropathy, anaemia, and infection which predisposes children to malnutrition, morbidity, and mortality (Piper *et al*., 2017). Social factors influence both family characteristics and environmental characteristics. Individual characteristics are influenced by family characteristics and environmental characteristics.

1.3 JUSTIFICATION

Nutritional status assessment is important for children and adolescents with disabilities since they are vulnerable to malnutrition, morbidity, and mortality. Disability is a major public health problem. Disabled people have high unmet health needs and therefore should be targeted (Lollar, 2017). The study is aimed at making a recommendation towards breaking the complex overlapping relationship between poor health and disability (Kuper & Smythe, 2018). To achieve

the sustainable development goals, the health and nutritional status of people with disabilities must be considered as a priority. This study is aimed at providing a recommendation which will break the vicious cycle of malnutrition, disability, and poverty. Disability is associated with low education, poverty and increase vulnerability to malnutrition (Eide & Ingstad, 2011; Mitra & Vick, 2012). Knowing the nutritional status of children and adolescents with disabilities would help the Educational and Health Directorates plan and intensify efforts on school health activities towards improving the health and well-being of the children. This research is not only aimed at contributing to the existing body of knowledge but to make recommendations for action. Findings would support in decision making, legislation and the inclusion of disability in national agenda (Albert, Dube, & Riis-Hansen, 2005). It is a fundamental right of disabled people to contribute their quota towards building a strong and resilient society, and this can only be realized with good health and nutrition status (UNICEF, 2017; WHO, 2011).

1.4 RESEARCH QUESTIONS

1. What is the level of thinness (BMI for age <-2SD) and stunting (height for age <-2SD) among blind and deaf school children and adolescents (5-19years)?
2. What socio-demographic factors are associated with the nutritional status of blind and deaf school children and adolescents?
3. What is the association between disability type (blind and deaf) and nutritional status (BMI for age and height for age)?

1.5 HYPOTHESIS

1. Stunting and thinness rates are high among blind and deaf school children and adolescents (5-19years).
2. Socio-demographic factors are associated with the nutritional status of blind and deaf school children and adolescents.
3. There is a significant association between disability type and nutritional status (BMI for age and height for age).

1.6 MAIN OBJECTIVE

To assess the nutritional status of blind and deaf school children and adolescents (5-19years) in three selected schools in the Eastern Region of Ghana.

1.6.1 SPECIFIC OBJECTIVES

1. To determine the prevalence of thinness (BMI for age <-2SD) and stunting (height for age <-2SD) among blind and deaf school children and adolescents.
2. To determine the association between socio-demographic factors and nutritional status (BMI for age and height for age) of blind and deaf school children and adolescents.
3. To determine the association between type of disability (blind and deaf) and nutritional status.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 DISABILITY IN DEVELOPING COUNTRIES

According to the WHO report, about 5% of people globally have hearing loss and 60% of the hearing loss in children and adolescents under 15years are preventable (WHO, 2016). Also, 3% of the global blind population are children, and about 80% of blindness is preventable or treatable (WHO, 2013). Disability prevalence rate varies tremendously from one country to the other. Among developing countries, the disability prevalence varies from 3% in Lao to as high as of 16% in Bangladesh. Disability prevalence has been found to be higher among women than men in every country. Bangladesh has the largest difference in disability prevalence of 23% among women, compared to 10% among men (Tuakli-Wosornu & Haig, 2014; WHO, 2011).

In Ghana persons with disability account for 3% of the total population (Ghana Statistical Service, 2010). However, the World Health Organization and the World Bank estimated the population prevalence of disability in Ghana as 7%-12% in 2011. The disability prevalence rate is higher among women (10.6%) than men (6.2%). Most of the Ghanaian adults (64%) with disabilities are women and prevalence is higher in older age groups. The most common types of disability in Ghana are; visual, auditory, and physical impairments. The disability prevalence among children aged 1-5 and 6-9 years in Ghana was 14.4 and 16.6 per 1000 respectively in 2001 (Mitra, Posarac, & Vick, 2011; Tuakli-Wosornu & Haig, 2014).

A systematic review study showed that in Sub-Saharan Africa, the prevalence of blindness decreased by 32% from 1.9% in 1990 to 1.3% in 2010. The major causes of blindness include

cataract, trachoma, diabetic retinopathy, refractive error, macular degeneration, glaucoma, and other/unidentified causes. The study showed that the prevalence of vision impairment was highest in West Africa and lowest in Central and Southern Africa (Naidoo *et al.*, 2014). A study in Ghana showed that disability of prisoners was caused by trauma (68.8%), infection (16.7%), and drug-related mental disabilities (6.3%) (Dogbe *et al.*, 2016). In developing counties studies have adequately explored the prevalence of disabilities but there is a gap in knowledge on the nutritional status of the disabled.

2.2 MICRONUTRIENT DEFICIENCIES AND DISABILITY

Micronutrients such as iodine, iron, zinc, vitamin A, and folate deficiencies contribute towards poor growth, perinatal complications, intellectual impairment, and increased risk of mortality and morbidity. The cycle of micronutrient deficiencies perpetuates across generations and have a devastating consequence for the future population (Bailey, West, & Black, 2015).

Vitamin A deficiency is responsible for half a million new cases of blindness every year and one to two million deaths. Vitamin A deficiency is prevalent among developing countries and it is the major cause of blindness in childhood. Vitamin A deficiency reduces the immune response and increases the severity and case-fatality of childhood infections such as measles and diarrhoea. (Sommer, 2001). Globally, low serum retinol concentration (<0.70 µmol/l) affects an estimated 19.1 million pregnant women and 190 million preschool-age children (WHO, 2009).

Iodine deficiency is the cause of preventable brain damage, abortions, stillbirths, congenital anomalies, increased perinatal mortality, endemic cretinism, deaf-mutism, and goiter. Iodine deficiency is responsible for a mean IQ loss of 13.5 points in the population and therefore a threat to the economic and social development (Bleichrodt & Born, 1996; Pearce *et al.*, 2016; WHO,

2004). Goiter is a reflection of chronic iodine deficiency and therefore used as a determinant of the severity and prevalence of iodine deficiency disorders in populations (WHO, 2014).

Globally, anaemia affects 1.62 billion people. The highest prevalence is in preschool-age children (47.4%) and the lowest prevalence is in men (12.7%) (WHO, 2005). Iron deficiency anemia affects physical performance/work productivity in adults, cognitive and physical development of children. According to a study involving 187 countries, the global prevalence of anemia in 2010 was 33% and it was responsible for 68 million years lived with disability (Kassebaum *et al*., 2016).

2.3 NUTRITIONAL STATUS OF CHILDREN AND ADOLESCENTS

Globally, the prevalence of stunting in children under 5 years declined from 32.6% in 2000 to 22.2% in 2017. Africa recorded a slow decline in the prevalence of stunting from 38.3% in 2000 to 30.3% in 2017 (UNICEF, WHO, and the World Bank Group, 2018). According to the GDHS 2014 report, Ghana's prevalence of stunting was 19% and the Eastern Region was 17% (Ghana Demographic Health Survey, 2014).

Nutritional status assessment of deaf adolescents' (10-19years) in India reported stunting and thinness prevalence rates of 35.6% and 66.3% respectively (Kuruvilla & Hanjra, 2016). A study in Iran among children and adolescent (5-15years) showed a prevalence rate of stunting of 71.7%, 36.3% and 17.7% for mentally retarded, deaf and blind respectively (Nachvak *et al*., 2016). A study in India comparing the deaf-mute boys and normal boys (5-18years) showed poorer nutritional status among the deaf-mute boys (Singh & Singh, 1993). Thinness and stunting rates were found to be 14.3% and 28.6% respectively among mentally disabled children in Western Turkey (Nogay, 2013). A similar study in Egypt showed that mentally disabled children (6-14years) underweight and stunting prevalence rates were 14.1% and 33.5% respectively.

However, muscle & fat depletion was found in 30.2% of the children (Abdallah *et al.*, 2007). A study conducted in Nigeria showed that neurological impaired children are nutritionally at risk than non-disabled children. Half pans were useful proxy measures and more reproducible by fieldworkers compared to demispan for estimating the height of children with physical disabilities (Tompsett, Yousafzai, & Filteau, 1999). A study showed that accurate height measures for children with physical impairments could be done with tibia length, arm span, and arm length (Yousafzai, Filteau, Wirz, & Cole, 2003). Several studies have shown high under nutrition and over nutrition among children and adolescents with disabilities. A study in Iran showed wasting/severe wasting of 12.6% and overweight/obese of 38.1% among children with disabilities (Nachvak *et al*., 2016). Children and adolescents with disabilities have higher under and over nutrition rates compared to children without disabilities as shown in a study in Chile. The risk of obesity was high for those with developmental delays, cerebral palsy and neurological disorders (Fitzpatrick *et al*., 2005). A study showed that overweight and obesity prevalence among disabled children was almost twice that of those without disabilities (Reinehr *et al*., 2010). Similar studies showed that overweight/obesity was higher among the blind than the deaf (Abolfotouh, 2014). Studies have shown that deaf children and adolescents were more physically active as compared to children and adolescent with visual impairment, cerebral palsy and muscular dystrophy (Longrnuir, 2000; Nachvak *et al*., 2016; Ritsuko *et al*., 2018). A study in Canada showed low caloric intake among the blind and high overweight and obesity. The weight gain was attributed to their low level of physical activity (Roebothan, 1999).

A study in the United States showed high overweight and obesity prevalence (28%) among deaf children and adolescents (2-20years). The study also showed that female's body mass index was higher than males. Interventions to reduced overnutrition among deaf children and adolescents should be tailored to meet differences in communication needs. A successful weight reduction

intervention programme would require the use of visual prompts, presentation of information, enforcement of school policies, well-motivated staff and parental involvement (Stough, Cordts, Delaney, & Davis, 2016).

2.4 THE RELATIONSHIP OF DISEASES, MALNUTRITION, AND DISABILITY

Poor health may lead to disability and vice visa. There is a complex overlapping relationship between health and disability as shown in Figure 2. Studies have shown that people with disabilities are more predisposed to experiencing poorer health or diseases (Kuper & Smythe, 2018).

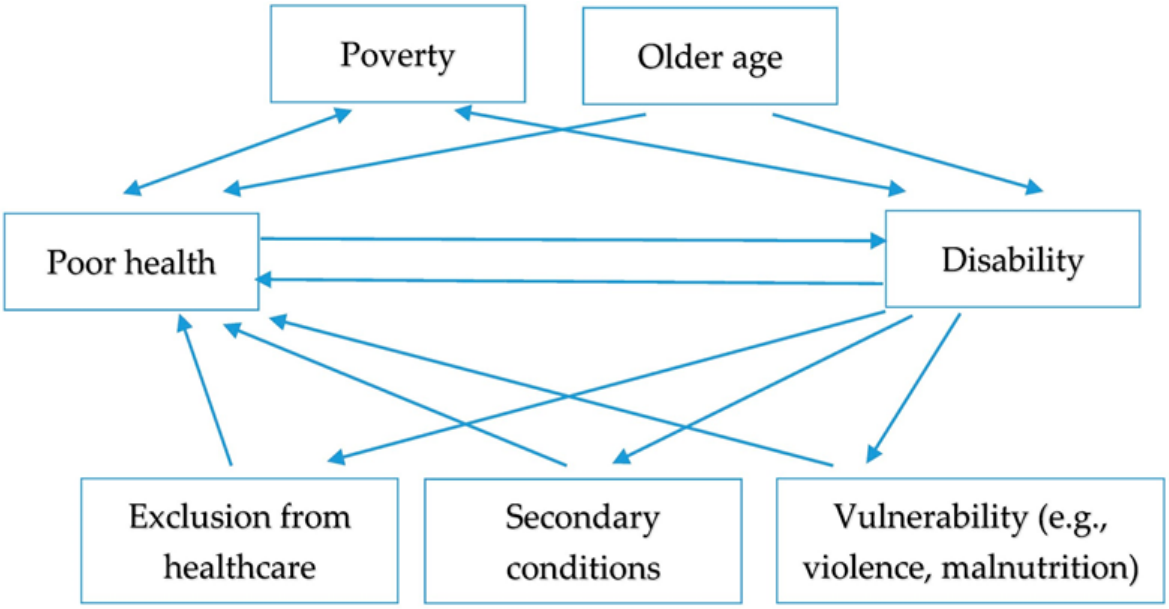

Figure 2: Relationship between disability and poor health

(Kuper & Smythe, 2018).

The African Child Policy Forum reported that about 50 percent of hearing and deafness disabilities are avoidable through preventive measures, early diagnosis, and management of meningitis, malaria, mumps, measles, chronic ear infections and tuberculosis (ACPF, 2014). Investment in health and nutrition, health education and promotion, improvements in maternal and neonatal health, provision of medical equipment and infrastructure are key to reducing the burden of avoidable deafness and blindness (Solebo, Teoh, & Rahi, 2017).

Malnutrition and disability are interrelated. Malnutrition could cause disability and disability could predispose the individual to malnutrition. Studies have shown that disabled children and adolescents are more at risk of poor nutrition and diseases. Mental and delay motor development is associated with chronic malnutrition (Wu *et al.*, 2017). Micronutrient deficiency (vitamin A, vitamin B6, iodine, and iron) could result in neurodisability. Neurodisability could cause reduced food intake, increased nutrient loss and increased nutrient demand or need (Kerac *et al*., 2014; Kuper *et al*., 2014). A study in Egypt showed an association of protein-energy malnutrition with hearing impairment among children (Boshra, Ezzat, Elkabarity, & Ahmed, 2016).

Measles, malaria, and vitamin A deficiency increased blindness prevalence of children in developing countries (1.2/1,000 children) than in developed countries (0.3/1,000 children) (Yorston & Naughton, 2004). Studies have shown that cognitive damage is a result of iodine deficiency. In a year, about 250,000 to 500,000 children were blind due to vitamin A deficiency (UNICEF, 2013). A disability screening study involving 18 countries showed that children (2-4years) who screened positive for disability were mostly those who were not breastfed, stunted and/or did not receive vitamin A supplementation (Gottlieb *et al*., 2005).

Children with disabilities have poorer dental status and require high dental treatment need (Shivakumar, Patil, Kadashetti, Rajmane, & Raje, 2018). Dental caries is a common disease among

disabled children and usually interferes with their food intake. A study showed a high overall mean score for dental caries among disabled children, this increases as the child's age increases. The mean decay-missing-filled teeth of blind and hearing impaired children were 2.16 and 1.80 respectively, implying more dental caries among blind children than deaf children (Sanjay *et al*., 2014). A study on dental health status showed that deaf children and adolescents had poorer oral hygiene as compared to those without a disability. This study showed that poor oral hygiene was associated with the low educational level of mothers (Kumar & Dagli, 2008).

2.5 FACTORS INFLUENCING NUTRITIONAL AND HEALTH STATUS

According to the UNICEF conceptual framework of malnutrition, malnutrition is caused by immediate, underlying and basic causes. The immediate causes of malnutrition and disability include; diseases and inadequate dietary intake. Underlying causes include inadequate dietary intake/feeding and care practices, inadequate household food security and nutrition security, and inadequate health services, water, hygiene, and sanitation. The basic or structural factors that influence nutritional status include economic, educational, cultural, political and ideological factors (UNICEF, 1998, 2015).

2.5.1 FEEDING AND CARE PRACTICES

The quality of care given children could affect their health and nutritional status greatly. Children with disabilities such as physical or intellectual disabilities require assistance to eat because of difficulty in feeding themselves. Feeding difficulties among disabled children predispose them to malnutrition. Most disabled-associated ill health and wasting are usually connected with feeding problems (Penagini *et al*., 2015). Disabled children with feeding difficulties require longer time and support from caregivers to enable them to feed adequately to meet their daily requirements.

Parental/caregiver responses about feeding difficulties and training of health workers are useful for early identification and support of children with feeding problems. A study in India showed that the relative risk of malnourished was significantly higher among disabled children with feeding difficulties than disabled children without feeding difficulty (Yousafzai, Filteau, & Wirz, 2003). The care a child receives from parents and community has lifelong benefits of improving his or her health and early childhood development (Pia *et al.*, 2016). Inadequate care and poor early conditions such as poor nutrition, infection, and stress predispose the individual to risks of chronic diseases and/or disabilities in adulthood (Monteverde & Pall, 2017). The quality of medical care and education provided in institutions could affect the developmental capacity of children with disabilities (UNICEF, 2017).

Inadequate care for children with disabilities could result in malnutrition or poorer health outcomes which affects the quality of life of caregivers/parents. A study in Ghana showed a high prevalence of malnutrition among children with cerebral palsy. The quality of life of parents/caregivers of these children was poor. The feeding difficulty was associated with poorer caregiver quality of life ($p<0.001$) and malnutrition of children (Adams *et al.*, 2018).

2.5.2 FOOD AND NUTRITION SECURITY

Food security and nutrition security are major factors contributing to undernutrition (Wolde, Berhan, & Chala, 2015). About 90% of the world's hungry people; who are mostly disabled people suffer from chronic food and nutrition insecurity. Food and nutrition security could affect the development potentials of children (UNICEF, 2015). A study showed that physical and intellectual development potentials of children are largely affected by food and nutrition security (Göttingen, Stuttgart, & Rottenburg, 2005). Studies have established the link between food insecurity and malnutrition. However, studies have not fully explored the link between food insecurity and

disability. A study showed that families of children with disabilities or special health care needs are predisposed to food insecurity. This high costs of accessing complex medical care and educational services could negatively influence household food security. Caregivers may forego employment, truncate work hours or obtain more flexible and lower wage jobs because of the high demand for care needs of these children (Rose-Jacobs *et al*., 2016). Food insecurity among the disabled may also be due to stigma and discrimination resulting in the disproportionate allocation of household food. A study showed that some disable people are provided with less nutritious foods and/or denied food (Groce, 2005).

Food insecurity can predispose children and adolescents to a greater risk of obesity because of non-uniform consumption patterns and altered food choices. Aggregate food-insecurity measures were different from personal food-insecurity measures in children and adolescents. A study among children and adolescents showed that personal food insecurity is associated with an increased predisposition to obesity in children (6-11) years. There was no significant association between obesity and personal food insecurity for children within the age group (2-5) years. The study also showed no significant association between obesity and food insecurity at the household level for either age group (Kaur, Lamb, & Ogden, 2015).

2.5.3 HEALTH SERVICES, WATER, HYGIENE AND SANITATION

Persons with disabilities face challenges of accessing health services, safe drinking water, and sanitation. A study in Ghana showed that people with physical disabilities have challenges in accessing primary health care in a rural area (Dassah, Aldersey, Ann, & Davison, 2018). Disabled peoples' health and nutrition status are affected by barriers to accessing health-care services (Tomlinson *et al*., 2009). A similar study in Nepal showed that most schools do not have gender, child and disability friendly water, sanitation and hygiene facilities and services (Bastola *et al*.,

2014). Studies have shown that improved access to safe water, hygiene and sanitation helps to significantly reduce the prevalence of stunting and improve in overall growth and development of children. Availability of household toilet facility and piped water, and observation of personal hygienic practices by individuals reduces the risk of infection and stunting (Cumming & Cairncross, 2016; Rah *et al*., 2015).

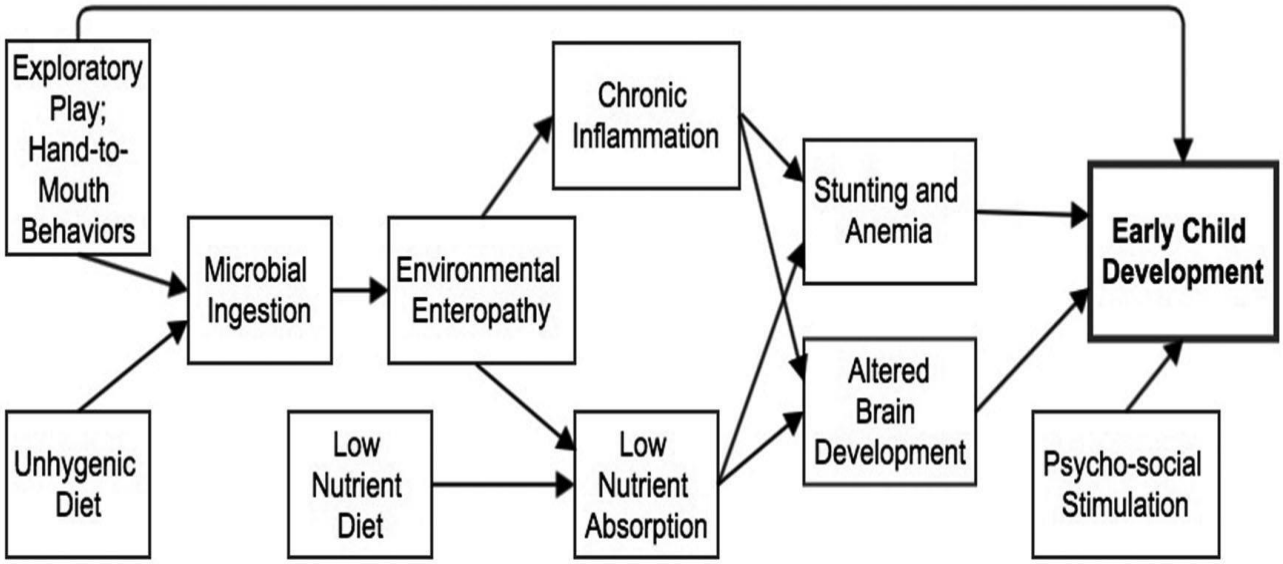

Figure 3: Relationship of poor hygiene in early childhood to child development

(Ngure *et al*., 2014)

Improved water sanitation and hygiene reduce enteropathy, anaemia, and infection which predisposes children to malnutrition, morbidity, and mortality (Piper *et al*., 2017). Poor water, sanitation, and hygienic conditions could result in stunting, anemia, and inflammation which could influence childhood development (Ngure *et al*., 2014). Drinking from the unsafe water source is a cause of river blindness affecting 27 African countries and putting about 100 million people at risk for blindness (ACPF, 2014). Globally in 2015, diarrhea was reported as a leading cause of 1.31

million deaths among all ages, as well as a leading cause of 71.6 million disabled-adjusted life year. Children suffer the greatest impact of diarrhea. In 2015, about 499 000 children under 5 years died due to diarrhea (Troeger *et al.*, 2017). Poor personal hygiene and environmental sanitization especially poor school environment make children and adolescents vulnerable or susceptible to cross-transmission of infectious skin diseases. A study in Egypt showed a high proportion of disabled children and adolescents with skin diseases. The proportion of presence of skin diseases among the mentally retarded, deaf and blind children and adolescence were 69.8%, 68.8%, and 60.6% respectively (El-Hamd *et al.*, 2017).

2.5.4 SOCIO-CULTURAL FACTORS INFLUENCING THE NUTRITIONAL STATUS OF THE DISABLE

Socio-cultural factors influencing the health and nutritional status of disabled people varies in different societies/cultures. Cultural and religious beliefs in a society highly influence the attitudes of people towards the disabled. Stigma, discrimination, fears or beliefs that disabled people would defile latrines and water sources could affect their access to these facilities; seeking for alternate sources may be detrimental to their health (UNICEF, 2017). Studies on socio-cultural factors links with disability and malnutrition have not been fully explored. A study showed that the attitudes of people vary based on the type of disability. The physically disabled have the most positive attitude from people, this is followed by the visual and hearing impaired and intellectual disabled (Slikker, 2009). Children with disabilities suffer from various forms of abuse including social abuse (neglect, isolation, restriction of participation in social activities and movement), capital abuse (disabled children life termination), emotional abuse (psychological) and physical abuse (physical assaults) (Kassah, Lilljan, & Kassah, 2012; Stalker & McArthur, 2012). They also suffer from

sexual offenses, which include those involving penetration, use of force, repeated abuse and threats. A study showed that children with higher or severe levels of disabilities were associated significantly with a high risk of sexual abuse (Hershkowitz & Lamb, 2015). They are usually at higher risk of abuse and violence which could create secondary disabilities. Beliefs such as sexual intercourse with a virgin as the cure for HIV/AIDS in some African countries and assumption that girls with disabilities are not sexually active put them at greater risk for "virgin rape" (Groce, 2005). Children with developmental disabilities are more likely to be maltreated as compared to those without disabilities (Jones *et al*., 2012). Studies have shown that children with disabilities have 3-4 times greater risk of violence during their lifetime than children without disabilities (Sonali & Lito, 2016). A study comparing the prevalence of maltreatment among disabled and non-disabled children showed a 31% prevalence rate of maltreatment for the disabled children and 9% prevalence rate of maltreatment for non-disabled children (Sullivan & Knutson, 2000). It is reported in Ghana that, some psychotic persons including children are chained to trees for lengthy periods, denied food, exposed to the sun and other forms of abuse in prayer camps for supposed 'healing'(ACPF, 2014).

A study in Ghana showed that families of disabled people do not give them adequate support to access developmentally useful services such as education that would improve on their lives, enable them to secure jobs and position them to overcome barriers that limit their inclusion in society (Opoku *et al*., 2017). A study on the living conditions of people with disabilities in Malawi showed that children with disabilities are twice likely to have never attended school as compared to children without disabilities (Loeb & Eide, 2004). In some societies, girls with disabilities are denied education, employment, and appropriate health care services. Poor nutritional status and

infectious diseases among girls occurs due to gender bias in food distribution at the household level (Ndiku, Jaceldo-Siegl, Singh, & Sabate, 2010). Children and adolescents with disabled children have the same rights as those without disabilities. All children and adolescents are to be protected from all forms of maltreatment or abuse. The disabled have the rights to express themselves, participate fully in decision making, have their concerns listened to and appropriately addressed and above all receive support to enable them recover from abuse or maltreatment (Hernon, Brandon, Cossar, & Shakespeare, 2012).

All people should be educated on disability to enable them to acquire a positive perception and attitudes towards the disabled. A study in Ghana to determine the perceptions of University students about disabilities highlight the huge knowledge gap of disability. The students supported the idea of equal rights and community integration of persons with disabilities. However, some felt uncomfortable interacting with the disabled and many were ambivalent about characteristics of persons with disabilities, having the notion that disabled people were intrinsically different from the non-disabled persons (Naami & Hayashi, 2012). Developmental challenges could be improved with early identification and intervention. However, most parents/caregivers including health workers have inadequate knowledge of developmental disabilities. They lack the skills to identify and support children with disabilities (Shannon & Tappan, 2017).

2.5.5 ECONOMIC FACTORS AND NUTRITIONAL STATUS

Economic factors or low-income level affects the dietary pattern and nutritional status. Poverty is a cause and consequence of nutritional disorders and disabilities. The World Bank reported that one in five of those who live on less than one dollar a day have disabilities (UNICEF, 2017). Poverty and unemployment are high among the disabled as compared without disability (Kraus,

2016). A study showed that people at risk of poverty consumed fewer fruits, fish and water, and soft drinks as compared to those not at risk of poverty (Lührmann, Simpson, Lührmann, & Gmünd, 2015). Disability is associated with low education, poverty and increase vulnerability to malnutrition (Mitra & Vick, 2012; Ingstad, 2011). People with disabilities have statistically significantly lower employment rates and lower educational attainment than people without disabilities (Tuakli-Wosornu & Haig, 2014; WHO, 2011). Studies have shown that children without disabilities were more likely to be in school as compared to those with disabilities. They are less likely to fulfill their educational potentials and therefore are more vulnerable to poverty, unemployment, and illness in their lifetime (Kuper *et al*., 2014). A study in Australia reported that predictive factors such as low birth weight, chronic and infectious diseases increase disability prevalence. These factors are greater in communities with higher rates of unemployment, lower levels of income, poor diet and poor access to adequate health care (Biddle et al., 2014).

Figure 4 shows the vicious cycle of poverty and disability. Poverty apart from causing disability can also lead to secondary disabilities for the already disabled. Secondary disabilities may be due to poor living conditions, malnutrition, and health-endangering employment, poor access to education opportunities and health care and among others (Pinilla-Roncancio, 2015). Disability in children can impoverish families. Families' spent money and time and in caring for the special needs of these children instead of working (Kuhlthau & Perrin, 2001b).

Figure 4: Poverty, Disability and Development

(Department for International Development, 2000)

Breaking the vicious cycle of poverty and disability would require increased and continuous investments by governmental and non- governmental organizations. Disability common fund used judiciously to support disabled people and their families including assistance to access health care, provision of assistive devices, payment of school fees, and awareness creation among others have a positive impact on the lives of disabled people (Edusei *et al*., 2016).

2.5.6 SOCIO-DEMOGRAPHIC CHARACTERISTICS, NUTRITIONAL STATUS, AND DISABILITY

Several studies have shown varied socio-demographic characteristics influence children and adolescents' health and nutritional status. In Ghana, a study showed children health and nutritional status associated with high dependency, rural-urban disparities, maternal education and family income (Quansah *et al.*, 2016). A similar study in Kenya showed household income level, mothers'

age and education influencing the nutritional status of children (6-59 months) (Omondi & Kirabira, 2016). A case-control study revealed that disabled children had a more female head of household compared to children without disabilities. Enrollment in school was higher for children with epilepsy, visual or physical impairment than intellectual and hearing impairment (Kuper *et al*., 2015). A study in Egypt showed that age, marital status, sex, and poor sanitation was associated with blindness (Fouad, Mousa, & Courtright, 2004). A comparative study of mentally and sensory disability showed educational status and monthly income of mothers of children as risk factors of malnutrition. The study also showed variation in nutritional status among the types of disability (blind, deaf, Down's syndrome, and autism) (Hussein, 2018). Similar studies showed having a child with a disability as associated with reduced maternal and paternal unemployment (Kuhlthau & Perrin, 2001a).

The determinants of nutritional status include education of parents, health service availability, assets of the household, gender inequalities, sanitation and water (Kamiya, 2017). A study in Bangladesh showed that possession score and maternal education were the main predictors of nutritional status of children. Comparing possession score and poverty index, the study showed that possession score was a better indicator of undernutrition (Mohsena, Mascie-taylor, & Goto, 2010). A study Iran showed the existence of significant socioeconomic inequalities in deafness, blindness, hand disorders, and vocal disorders. The poorer provinces had a higher prevalence of disabilities in deafness, blindness, hand disorders, and vocal disorders. The also showed significant associations between the socio-demographic variables such as sex, age-groups, employment status, education level and disability (Moradi *et al*., 2018).

2.5.7 CARE DEMANDS, PARENTAL STRESS, AND NUTRITIONAL AND HEALTH STATUS

The care provided by caregivers/parents greatly influences the nutritional and health status of children with disabilities. Inadequate care could lead to malnutrition or poor health outcome. Studies have indicated that care for children with special needs or disabilities can pose stress on parents and disruption family relationship. Single mothers or parents are usually more stress as compared to two parents' families. Time demands, mental retardation of children and child behavior among others put stress on parents or caregivers (Floyd & Gallagher, 2017).

In Ghana, parents/caregivers of children with disabilities have indicated that they spend extensive time spent in caring for these children. The well-being of parents /caregiver and children is negatively influenced by the lack of educational facilities and the poor health status of their children. The high demand of time and care for these children and the need to earn an income to provide for the family causes them to sink into poverty and further perpetuates the challenge to provide the needs by these children (Besten, Cornielje, Cornielje, & Botwey, 2016). The care mostly required by these children include primary and preventive services, subspecialty care, nutritional support, and specialized therapies. These service among others are usually inadequate in most places (Perrin, 2017). Children development is influenced by their intrinsic motivations and positive relationship or support from family members. Child development is greatly influenced by the relationship between the child and his/her mother. Studies have shown that positive relationship improves feeding and cognitive development (Hauser-Cram *et al*., 2017).

A study showed that parent or caregivers who participate in church activities are better able to cope with the stress of caring for disabled children than those who do not. These caregivers

received ministration from the church, encouragement and social support which enables them to cope with the stress (Hughes, 2017). Service providers can encourage the religion and spirituality of parents/caregivers of children with disabilities as a mechanism of the positive coping strategy of stress. Religious practices bring solace, strength, emotional and practical support during difficult times (Poston & Turnbull, 2017). Improvement in parents/caregivers ability to cope with stress positively improves the health and nutritional status of disabled children. A study suggested that having an imagery companion is associated with social and emotional benefits which positively influence the health of children. Children with an imaginary companion have a richer fantasy life and engage symbolic pretend play than children without an imaginary companion. Deaf children have higher rates of a current or prior imaginary companion than blind children (Smith, 2018).

CHAPTER THREE

3.0 METHODS

3.1 TYPE OF STUDY

3.2.1 LOCATION AND LAND SIZE

Cross-Sectional study design was used to determine the nutritional status of blind and deaf school children and adolescents within the age group 5-19years in three selected schools in the Eastern Region of Ghana. Anthropometric and socio-demographic data of these children and adolescents were collected.

3.2 STUDY AREA

The Eastern Region is one of ten administrative regions, located in the southern part of Ghana and covers an area of 19,323 square kilometers and lies between longitude 0°30' East and 10° 30' West and between latitude 60° and 70° N. It has 26 districts and bordered to the north and west by Ashanti region, north by Brong-Ahafo region, east by the Lake Volta, to the south by Greater Accra and Central regions. The main spoken language are Akan, Ewe, and English. Eastern Region is the third most populous region after Greater Accra Region and Ashanti Region. It has about 4,086 communities (rural & urban).

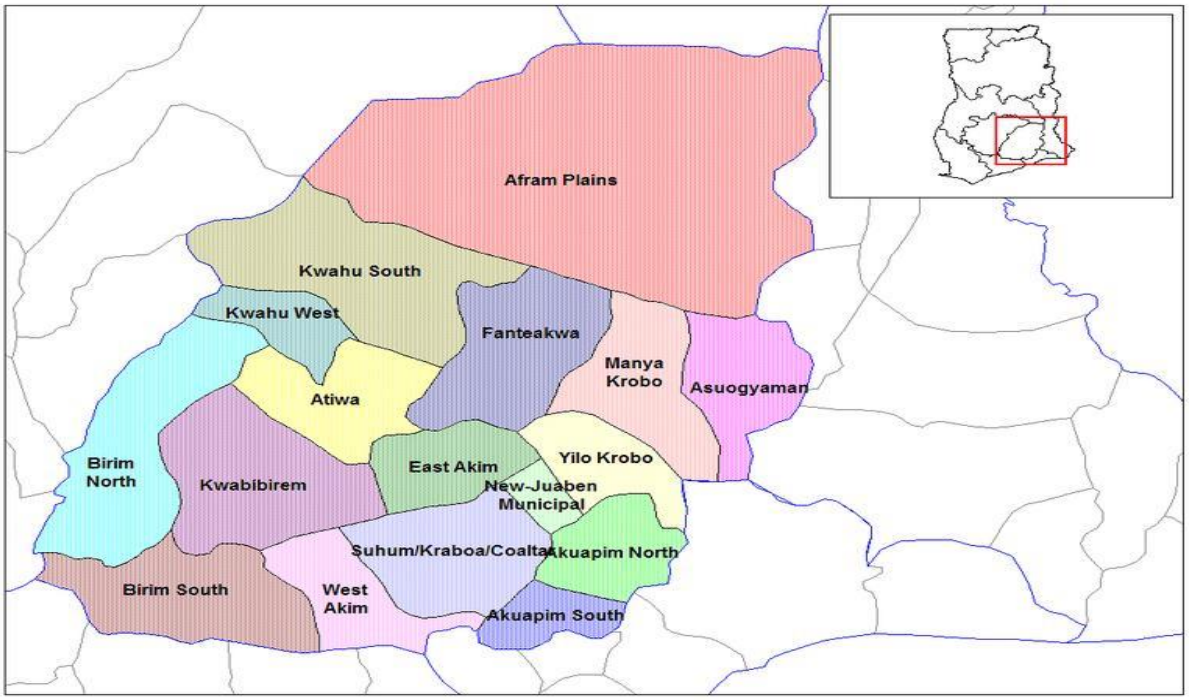

Figure 5: Map of the Eastern Region of Ghana

Source: https://en.wikipedia.org/wiki/Eastern Region (Ghana)

3.2.2 POPULATION

The results of the 2010 population and housing census showed a total population of 2,633,154 in the Eastern Region with male and female populations of 49.1% and 51.0% respectively. The total population for the three-districts selected for the study is Akwapem North (136,483), East Akim Municipal (167,896) and New Juabeng Municipal (183,727) and with their rural population of 65.9%, 40.4% and 6.7% respectively (Ghana Statistical Service, 2013).

3.2.3 CLIMATE

The Eastern region experiences double maxima rainfall in June and October. The region lies within the wet semi-equatorial zone. The first rainy or wet season occurs from May to June and the second

season is from September to October. The heaviest rainfall occurs in the month of June. There are little variations in rainfall patterns between the districts. Temperatures in the Eastern region range between 26^0 C in August and 30^0 C in March, whiles the relative humidity varies between 70%-80%.

3.2.4 OCCUPATION

The major occupations of the working population in the Eastern region include agriculture, sales, production, transport and equipment work and professional and technical work.

3.2.5 DISABILITY IN EASTERN REGION

According to the Ghana Statistical Service, Eastern Region has 3.6% of the regional population with disability. It is the fourth region in Ghana with a high proportion of the population with disability. The prevalence of population with a disability varies differently among the districts in the region. The districts with about the same percentage of disability population as the regional average include; East Akim municipal (3.5%), Birim municipal (3.5%), Suhum-Kraboa-Coaltar (3.8%) and Akwapem South (3.7%). The rest of the other districts have disability percentages that are far below or above. The highest percentages of disabled persons in the various districts occur among the youngest (0-14 years) and oldest (65+ years). The proportion of the population with a disability for age groups (0-14 years) and (15-24 years) are 15.4% and 11.9% respectively. On the whole, the proportions of people with disability are lower in the urban populations of the districts than in the rural populations (Ghana Statistical Service, 2013).

According to the Ghana Statistical Service, Eastern Region has more females (53.4%) with disabilities than males (46.6%). Atiwa (6%) has the highest disability prevalence in the region, followed by New Juabeng Municipal (4.3%), East Akim Municipal (3.5%) and Akwapem North

(3.0%). The educational level of the disabled is generally low in the population. Most districts have over 50 percent of Basic School attendants, however, for the whole region, an averagely of 10.8% of the disabled have secondary and higher education. The types of disability in the region include: sight (42.3%), physical (29.4%), emotional (18.1%), hearing (15.9%), intellectual (15.6%), speech (15.2%) and others (7.9%) (Ghana Statistical Service, 2013).

There are four schools currently in the Eastern region with deaf and blind children and adolescents. Kibi School for the Deaf is located in the East Akim Municipal, Koforidua School for the Deaf in the New Juabeng Municipal, Akropong School for the Blind and Mampong School for the Deaf are in the Akwapem North district.

3.3 VARIABLES

The independent variables were the socio-demographic characteristics which include; sex, age, ethnicity, religion, education, and occupation of mother and father, family size and place of residence. However, the dependent variable was the nutritional status (BMI-for-age and height-for-age) of the children and adolescents. Age, the frequency of illness and family size were categories as shown in Table 3.3.1. The nutritional status (BMI-for age and height-for-age) were also categories using child growth standards of the World Health Organization (WHO, 2008).

Table 3.3.1: Dependent and Independent variables of the study

Variable	Definition	Type of variable
Dependent variable		
Nutritional status		Categorical
BMI-for-age	Thinness (<-2SD) Normal (-2SD≤ to ≤1SD) Risk of overweight (1SD< to ≤2SD) Overweight (2SD< to 3≤SD) Obese (>3SD)	
Height-for age	Severe stunting (<-3SD), Stunting (-3SD≤ to <-2SD), Normal (-2SD≤ to ≤ 3SD) Tallness (3SD<)	
Independent Variables		
Age	Age at last birthday	Continuous
Age category	(5-9, 10-14, 15-19)years	Categorical
Sex	Male or Female	Categorical
Residence	Urban or Rural	Categorical
Family size	1-4, 5-9, 10-14, 15-20	Categorical
Frequency of illness within past 6months	0, 1-3, 4-6,7-10	Categorical

3.4 STUDY POPULATION

The study population was school children and adolescents with blind only and deaf only disabilities aged (5-19 years) in three selected schools in the Eastern Region of Ghana.

3.5 SAMPLING

3.5.1 SAMPLE SIZE

A sample size of 313 children and adolescents was used for the study. This was estimated using prevalence of thinness among school children and adolescents with hearing impairment of 24.4% (Parvez *et al*., 2016).

Sample-size (**n**) for the study was calculated using the Cochrane formula (Israel, 1992).

$$n = \frac{z^2 p(1-p)}{d^2}$$

Where;

z = Critical value (a two-tailed test, equal to 1.96 for 95% confidence α= 0.05).

p = Estimated prevalence of thinness (24.4%) (Parvez, Siddiui, Khan, Hasmi, & Khan, 2016).

d = Absolute sampling error (±0.05).

$$n = \frac{1.96^2 \times 0.244 \times (1-0.244)}{0.05^2}$$

$$n = 284$$

For a 10% non-response rate of 29, the required sample size was increased to 313.

Table 3.5 1: Number of participants selected in each school

Name of School	Total students population	Percentage of Participants (%)	Number of participants	Total
Kibi school for the Deaf	228	28.4	89	Deaf=170
Koforidua school for the Deaf	208	25.9	81	
Akropong school for the Blind	367	45.7	143	Blind=143
Total	**803**	**100**	**313**	

Source: Kibi, Koforidua and Akropong Schools registers of students' enrollment (January 2018).

3.5.2 SAMPLING METHOD

Both purposive and simple random sampling methods were used. Eastern Region was selected for the study because of its high disability prevalence (3.6%). Eastern Region is the fourth region in Ghana with a high proportion of the population with disability. Three (3) schools (Kibi School of the Deaf, Koforidua School for the Deaf and Akropong School for the Blind) were selected for the study out of the four (4) blind and deaf schools in the Eastern Region. All four school were not enrolled in the study because one of the school (Mampong School for the deaf) was used for pretesting of the questionnaire. The two (2) schools for the deaf (Kibi School of the Deaf and Koforidua School for the Deaf) were selected to enable the researcher to get the required sample size of eligible deaf students to compared with the blind students. Eligible school children and adolescents were selected using simple random sampling technique. This was done by balloting in each school and eligible students who picked YES were interviewed and their weight and height measurements are taken.

3.6 DATA COLLECTION TECHNIQUES/METHODS/TOOLS

Socio-demographic data were collected with a structured pre-tested questionnaire. The questionnaire was read to the blind children and adolescents whiles a sign language interpreter and researcher administered a questionnaire to the deaf school children. Anthropometry measures of weight and height of children and adolescents were taken. Both the weight and height measurement of each child or adolescent was taken twice and averages calculated as the actual weight and height.

3.6.1 WEIGHT MEASUREMENT

The weight was taken to the nearest 0.1kg using standard procedures with Seca Uniscale. The scale was put on and turned to zero. The child or adolescent to be weighed emptied his/her pockets, removed jewelry, and extra clothing. The following were also ensured before the weight measurement was taken; even body weight distributed between both feet, the head is up, and looks straight ahead, hands at sides, palms toward the thighs and arms hang freely by the sides of the body (CDC, 2007; Rockenbach *et al*., 2010).

3.6.2 HEIGHT MEASUREMENT

Height was measured to the nearest 0.1cm using standard procedures with Tanta HR stadiometer. The child or adolescent was made to stands with back against the board and the back of the head, and shoulder blades, buttocks, and heels in contact with the board. Before the height measurement was taken the following were ensured; even body weight distributed on both feet, palms facing the thighs, arms hang freely by the sides of the body, legs placed together, knees or ankles together, standing erect with head up, facing straight ahead and aligned in Frankfort Horizontal Plane. The child or adolescent was made to inhale deeply holding his/her breath without moving head or body

and the headpiece lowered down onto the uppermost point on the head. The hair of the child was compressed and the child told to let breath out and height was recorded (CDC, 2007; Rockenbach *et al*., 2010).

3.6.3 INCLUSION CRITERIA

School children and adolescents were included if;

- They were in the age range of 5–19 years.
- They were either blind or deaf.
- They were willing to participate in the study.

3.6.4 EXCLUSION CRITERIA

School children and adolescents were excluded if;

- They had multiple disabilities.
- They were partially blind or partially deaf or both.

3.7 QUALITY CONTROL

Quality-control efforts were applied at all levels of the research. Training of interviewers was carried out to ensure the quality and consistency of the information collected. Pretest of the questionnaire was conducted in the Mampong School for the Deaf in the Eastern Region of Ghana. There was monitoring of interview sessions and each questionnaire was reviewed by the principal investigator to check for possible errors. The weighing scale and stadiometer were calibrated each day before use. The final data set was evaluated to check the accuracy of the data before analyses. Reliability check was conducted on all analyses performed. All data collected was kept in the possession of the principal researcher.

3.8 DATA PROCESSING AND ANALYSIS

Stata software version 15 was used to analyze the data. Weight, height, age, household size, student class and frequency of illness were collected as continuous variables and were later transformed into categorical variables. BMI-for-age and Height for-age z-scores were calculated using WHO anthro plus software. Using WHO 2007 child growth standards classification, BMI-for-age was transformed into categories of thinness (<-2SD), normal (-2SD≤ to ≤1SD), risk of overweight (1SD< to ≤2SD), overweight (2SD< to 3≤SD) and obese (>3SD) whiles height-for-age was transformed into categories of severe stunting (<-3SD), stunting (-3SD≤ to <-2SD), normal (-2SD≤ to ≤ 3SD) and tallness (3SD<) (WHO, 2008).

Descriptive statistics of frequencies, tables and graphs were used to describe socio-demographic characteristic and prevalence of malnutrition (stunting and thinness). Pearson's chi-square (χ^2) test was used to find out the association between the socio-demographic characteristic and nutritional status (Height-for-age and BMI-for-age). Ordered logistic regression analysis was used to determine the influence of socio-demographic characteristics associated with nutritional status and crude and adjusted odds ratios were determined. Variables such as sex, place of residence and household size were controlled for in the multiple logistic regression model to determine the adjusted odds ratio.

3.9 ETHICAL CONSIDERATION

Ethical clearance was sought from the Ethical Committee of Basic and Applied Sciences, University of Ghana (ECBAS 012/17-18) as shown in appendix 5. Approval of the study was obtained from the Eastern Regional Education Service, District Educational Service and the schools which participated in the study.

Informed consent was sought from parents and assent sought from the children and adolescents. The participants were at liberty to withdraw entirely or opt out mid-way without consequences. Participants were rewarded with pen and pencil.

CHAPTER FOUR

4.0 RESULTS/ANALYSIS

4.1 SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

This study was aimed at determining the nutritional status of blind and deaf school children and adolescents and the socio-demographic factors associated with nutritional status. Three hundred and thirteen (313) students were sampled from three different schools in the Eastern Region. Out of the 313 students, 54% were deaf while the remaining 46% were blind. In Table 4.1.1, more than half (52.4%) of the students sampled were male. Most of the deaf students were female (52.9%) whiles the blind were males (58.7%). About 56% fall under the age group 15-19 years and the average age was 14 years. Majority of the students were Christians (85%).

About 15.9% of the deaf students were Muslims whiles 9.1% of the blind students were Muslims. Most (71.9%) of the students come from monogamous home whilst 28.1% come from a polygamous home. About 34.7% and 20.3% of the deaf and blind are from polygamous families respectively. The study showed that about 52% of the students come from urban communities. Most of the blind students were from urban communities (63.6%) whiles the deaf were from rural communities (58.2%). The majority (46%) of the students indicated their disability was caused by illness whiles 33.5% was the congenital cause and 18.9% due to injury/accident. About 40.5% and 39.1% and 17.4% of the disabilities among the blind were due to congenital, illness and accidental/injury causes respectively. A few of the students were in the kindergarten/foundation class (3.5%) and vocational class (4.7%). Almost half (44%) of the students were Akans, while 23% were Ewes. Most of the students had both parents alive (76%).

About 4.9% of the blind students had none of their parents' alive whiles 1.2% of the deaf students had none of their parents alive. Most students (61%) belong to households with the size of 5-9 people. About 76.7% of the students indicated their fathers are the heads of household whilst few (18.5%) stated their mothers are the heads of their households. About 33.5% of the students' fathers attained JHS/Middle school level while about 11.6% had no formal education. However, about 17.6% of the students' had mothers with no formal education. About 25% of the deaf students had their mothers not educated whiles 8.5% of the blind had their mothers not educated. Also, about 15.2% of the deaf students had their fathers not educated whiles 6.4% of the blind had their fathers not educated. Comparing the educational status of the parents of both disabilities, the deaf students had the most parents with no formal education. The major occupations of the parents of the students were farming and trading. About 30.5% of the students have their fathers engaged in farming whilst 63.4% had their mothers engaged in trading.

Table 4.1 1: Socio-demographic characteristics of the respondents

Variable	**Blind (N=143) N (%)**	**Deaf (N=170) N (%)**	**Total (N=313) N (%)**
Sex			
Male	84(58.74)	80(47.06)	164(52.40)
Female	59(41.26)	90(52.94)	149(47.60)
Residence			
Rural	52(36.40)	99(58.20)	151(48.20)
Urban	91(63.60)	71(41.80)	162(51.80)
Student class			
KG/Foundation	11(7.69)	0(0.00)	11(3.51)
Primary 1-3	59(41.26)	35(20.59)	94(30.03)
Primary 4-6	38(26.57)	70(41.18)	108(34.50)
JHS1-4	20(13.99)	65(38.24)	85(27.16)
Vocational	15(10.49)	0(0.00)	15(4.79)

Table 4.1.1: Socio-demographic characteristics of the respondent cont'd

Variable	Blind (N=143) N (%)	Deaf (N=170) N (%)	Total (N=313) N (%)
Age (years)			
5-9	23(16.08)	8(4.71)	31(9.90)
10-14	52(36.36)	55(32.35)	107(34.19)
15-19	68(47.55)	107(62.94)	175(55.91)
Religion			
Christianity	130(90.91)	136(80.00)	266(84.98)
Islam	13(9.09)	27(15.88)	40(12.78)
Traditionalist	0(0.00)	4(2.35)	4(1.28)
Other	0(0.00)	3(1.76)	3(0.96)
Cause of disability			
Congenital	58(40.56)	47(27.65)	105(33.55)
Illness	56(39.16)	88(51.76)	144(46.01)
Accident/Injuries	25(17.48)	34(20.00)	59(18.85)
Others	4(2.80)	1(0.59)	5(1.60)
Ethnicity			
Akan	58(40.56)	81(47.65)	139(44.41)
Krobo	12(8.39)	16(9.41)	28(8.95)
Ewe	35(24.48)	38(22.35)	73(23.32)
Ga	18(12.59)	25(14.71)	43(13.74)
Other	20(13.99)	10(5.88)	30(9.58)
Head of Household			
Father	98(68.53)	142(83.53)	240(76.68)
Mother	35(24.48)	23(13.53)	58(18.53)
Other	10(6.99)	5(2.94)	15(4.79)
Household size			
1-4	45(31.47)	65(38.24)	110(35.14)
5-9	93(65.03)	98(57.65)	191(61.02)
10-14	5(3.50)	6(3.53)	11(3.51)
15-20	0(0.00)	1(0.59)	1(0.32)

Table 4.1.1: Socio-demographic characteristics of the respondents cont'd

Variable	Blind (N=143) N (%)	Deaf (N=170) N (%)	Total (N=313) N (%)
Parent Alive			
Father only	4(2.80)	15(8.82)	19(6.07)
Mother only	22(15.38)	24(14.12)	46(14.70)
Both alive	110(76.92)	129(75.88)	239(76.36)
None	7(4.90)	2(1.18)	9(2.88)
Mother Occupation			
Trader	92(69.17)	93(58.49)	185(63.36)
Farmer	13(9.77)	30(18.87)	43(14.73)
Government worker	10(7.52)	7(4.40)	17(5.82)
Unemployed	5(3.76)	5(3.14)	10(3.42)
Other	13(9.77)	24(15.09)	37(12.67)
Mother education			
No Formal education	11(8.46)	40(25.00)	51(17.59)
Primary	7(5.58)	25(15.63)	32(11.03)
JHS/Middle	60(46.15)	28(17.50)	88(30.34)
SHS/Technical/Vocational	18(13.85)	43(26.88)	61(21.03)
Tertiary	16(12.31)	22(13.75)	38(13.10)
Others	18(13.85)	2(1.250	20(6.90)
Father education			
No Formal education	7(6.36)	25(15.15)	32(11.64)
Primary	5(4.55)	12(7.27)	17(6.18)
JHS/Middle	48(43.64)	44(26.67)	92(33.45)
SHS/Technical/Vocational	20(18.18	48(29.09)	68(24.73)
Tertiary	16(14.55)	32(19.39)	48(17.45)
Others	14(12.73)	4(2.42)	18(6.55)
Father Occupation			
Trader	13(11.61)	35(22.88)	48(17.65)
Farmer	19(16.96)	64(40.00)	83(30.51)
Government worker	20(17.86)	16(10.00)	36(13.24)
Mechanic	7(6.25)	5(3.13)	12(4.41)
Driver	20(17.86)	10(6.25)	30(11.03)
Shoe maker	1(0.89)	5(3.13)	6(2.21)
Other	32(28.57)	25(15.63)	57(20.96)

Table 4.1.2: Characteristics of continuous variables

Variable	No. Observations	Mean	SD	Min	Max	P50
Age (years)	313	14.49	3.20	5	19	15
Weight (kg)	313	45.52	11.89	18.4	95.9	46
Height (cm)	313	154.07	13.55	105	184	155
BMI-for-age	313	-0.50	1.19	-4.20	4.03	0.62
Height-for-age	313	-0.84	1.44	-5.97	5.18	-0.99
Household size	313	5.52	2.08	2	20	5
The frequency of illness within past 6months	313	1.92	1.98	0	10	1

Table 4.1.2 shows that the mean age of the disabled students was 14.5years whiles the mean household size was 5.5. The students reported falling ill almost 2 times within 6months. The mean weight was 45.5 kg whiles the mean height of the students was 154.1cm. The minimum and maximum BMI-for age were -4.20 and 4.03 respectively. However, the minimum height-for-age was -5.97 whiles the maximum height-for-age was 5.18.

4.2 HEALTH AND NUTRITIONAL STATUS-RELATED VARIABLES

Table 4.2.1 shows that most of the students (71%) indicated pipe borne as their main source of water whilst about 2% indicated stream/river as a source of water. About 55% of the students mostly practice hand washing after use of a latrine. About 50% of the students mostly keep their fingernails neat or trimmed, whiles 58.7% mostly keep their clothes neat and 69% mostly bath regularly. The blind students observed personal hygiene better than deaf students. The blind students mostly washed their hands after used of the latrine (74.1%), trimmed their fingernails (64.3%), regularly took their bath (81.6%) and wore neater clothes/uniforms (73.2%) as compared to the deaf students.

Most of the blind students (39.2%) reported no illness/sickness within the past 6months as compared to deaf students (9.4%). About 65.3% and 9.4% of the deaf students reported falling sick about 1-3 times and 4-6 times within the past 6months respectively. The students within the past 6months prior to the study suffered from the following illness; malaria (28.4%), cough (18.9%), diarrhoea (14.1%), common cold (9.9%) and skin disease (2.2%). The deaf students reported a recent illness of malaria (33.5%), cough (24.7%), diarrhoea (20.6%), common cold (13.5%), and skin diseases (4.1%) as compared to the blind students within the past 6months.

Table 4.2.1: Characteristics of health and nutrition-related variables of the respondents

Variable		Blind (N=143) N (%)	Deaf (N=170) N (%)	Total (N=313) N (%)
Hand washing after use of latrine				
Not practiced		1(0.70)	30(17.65)	31(9.90)
Sometimes practiced		36(25.17)	78(48.88)	114(36.42)
Mostly practiced		106(74.13)	62(38.47)	168(53.67)
Neat clothing				
Not practiced		6(4.20)	21(12.35)	27(8.63)
Sometimes practiced		33(23.08)	77(45.29)	110(35.14)
Mostly practiced		104(72.73)	72(42.35)	176(56.23)
Trimmed fingernails				
Not practiced		5(3.50)	20(11.76)	25(7.99)
Sometimes practiced		46(32.17)	88(51.76)	134(42.81)
Mostly practiced		92(64.34)	62(36.47)	154(49.20)
Regular bathing				
Not practice		4(2.80)	15(8.82)	19(6.07)
Sometimes practiced		24(16.78)	61(35.88)	85(27.16)
Mostly practiced		115(80.42)	94(55.29)	209(66.77)
The frequency of illness within past 6months				
0		56(39.16)	16(9.41)	72(23.00)
1-3		81(56.64)	111(65.29)	192(61.34)
4-6		5(3.50)	27(15.88)	32(10.22)
7-10		1(0.70)	16(9.41)	17(5.43)
Illnesses within past 6months				
Malaria	Yes	32(22.38)	57(33.53)	89(28.43)
	No	111(77.62)	113(66.47)	224(71.57)
Common cold	Yes	8(5.59)	23(13.53)	31(9.90)
	No	135(94.41)	147(86.47)	282(90.10)
Cough	Yes	17(11.89)	42(24.71)	59(18.85)
	No	126(88.11)	128(75.29)	254(81.15)
Skin diseases	Yes	0(0.00)	7(4.12)	7(2.24)
	No	143(100.00)	163(95.88)	306(97.76)
Diarrhoea	Yes	9(6.29)	35(20.59)	44(14.06)
	No	134(93.71)	135(79.41)	269(85.94)
Source of water				
Pipe borne	Yes	108(75.52)	114(67.06)	222(70.93)
	No	35(24.48)	56(32.94)	91(29.07)
Well	Yes	12(8.39)	37(21.76)	49(15.65)
	No	131(91.61)	133((78.24)	264(84.35)
River/stream	Yes	2(1.40)	5(2.94)	7(2.24)
	No	14(98.60)	165(97.06)	306(97.76)
Sachet/bottle water	Yes	36(25.17)	15(8.82)	51(16.29)
	No	107(74.83)	155(91.18)	262(83.71)

4.3 NUTRITIONAL STATUS OF CHILDREN AND ADOLESCENTS WITH DISABILITIES

4.3.1 PREVALENCE OF THINNESS AND OVERWEIGHT/OBESITY

Table 4.3.1.1 shows the prevalence of thinness among children and adolescents with disabilities of 7.4%. The blind students had the most (7.7%) thinness compared with the deaf students (7.1%). Both disabilities recorded overweight and obesity prevalence of 8.6%. The blind students (14.7%) had higher overweight and obesity prevalence as compared to deaf students (3.5%).

Table 4.3.1.2 shows sex wise classification of BMI-for-age. About 11.0% of males were thin (BMI-for-age <-2SD) whiles 3.4% of females were thin (BMI-for-age (<-2SD). About 7.9% of male students were overweight/obese whiles 9.4% of female students were overweight/obese.

Table 4.3.1.3 shows age wise classification of BMI-for-age. Students within age groups 10-14years and 15-19years had 8.4% and 8.0% of thinness respectively. Students within the age group 5-9years had higher overweight/obese (22.6%) compared to those in age group 10-14years (9.3%) and 15-19years (8.6%).

Table 4.3.1.1: BMI-for-age of blind and deaf students

Type of disability	Thinness (<-2SD)	Normal (-2SD≤ to ≤1SD)	Risk of overweight (1SD< to ≤2SD)	Overweight (2SD< to 3≤SD)	Obese (>3SD)	Total
Blind	11 (7.69)	111(77.62)	13(9.09)	4(2.80)	4(2.80)	143(100.00)
Deaf	12 (7.06)	152(89.41)	5(2.94)	1(0.59)	0(0.00)	170(100.00)
Total	23(7.35)	263(84.03)	18(5.75)	5(1.60)	4(1.28)	313(100.00)

SD=Standard deviation

Table 4.3.1.2: Sex-wise classification of BMI-for-age

Sex	BMI-for-age Thinness (<-2SD)	Normal (-2SD≤ to ≤1SD)	Risk of overweight (1SD< to ≤2SD)	Overweight (2SD< to 3≤SD)	Obese (>3SD)	Total
Male	18(10.98)	133(81.10)	8(4.88)	2(1.22)	3(1.83)	164(100.00)
Female	5(3.36)	130(87.25)	10(6.71)	3(2.01)	1(0.67)	149(100.00)
Total	23(7.35)	263(84.03)	18(5.75)	5(1.60)	4(1.28)	313(100.00)

SD=Standard deviation

Table 4.3.1.3: Age-wise classification of BMI-for-age

Age group (years)	BMI-for-age Thinness (<-2SD)	Normal (-2SD≤ to ≤1SD)	Risk of overweight (1SD< to ≤2SD)	Overweight (2SD< to 3≤SD)	Obese (>3SD)	Total
5-9	0(0.00)	24(77.42)	5(16.13)	2(6.45)	0(0.00)	31(100.00)
10-14	9(8.41)	88(82.24)	5(4.67)	1(0.93)	4(3.74)	107(100.00)
15-19	14(8.00)	151(86.29)	8(4.57)	2(1.14)	0(0.00)	175(100.00)
Total	23(7.35)	263(84.03)	18(5.75)	5(1.60)	4(1.28)	313(100.00)

SD=Standard deviation

4.3.2 PREVALENCE OF STUNTING

Table 4.3.2.1 and Figure 8 shows that the prevalence of stunting among children and adolescents with disabilities was 17.6%. The blind students (19.6%) had higher stunted growth compared with the deaf students (15.9%). Table 4.3.2.2 shows sex wise classification of height-for-age. About 20.7% of males were stunted (height-for-age <-2SD) whiles 14.1% of females were stunted (height-for-age (<-2SD).Table 4.3.2.3 shows age wise classification of height-for-age. Students within age groups 15-19years (24.6%) had higher stunting rate compared to those within 5-9years (6.5%)) and 10-14years (9.4%).

Table 4.3.2 1: Height-for-age of blind and deaf students

Type of disability	Severe stunting (<-3SD)	Stunting (-3SD≤ to <-2SD)	Normal (-2SD≤ to ≤ 3SD)	Tallness (3SD<)	Total
Blind	5(3.50)	23(16.08)	111(77.62)	4(2.8)	143(100.00)
Deaf	6(3.53)	21(12.35)	140(82.35)	3(1.76)	170(100.00)
Total	11(3.51)	44(14.06)	251(80.19)	7(2.24)	313(100.00)

SD=Standard deviation

Table 4.3.2 2: Sex-wise classification of height-for-age

Sex	Severe stunting (<-3SD)	Stunting (-3SD≤ to <-2SD)	Normal (-2SD≤ to ≤ 3SD	Tallness (3SD<)	Total
Male	7(4.27)	27(16.46)	126(76.83)	4(2.44)	164(100.00)
Female	4(2.68)	17(11.41)	125(83.89)	3(2.01)	149(100.00)
Total	11(3.51)	44(14.06)	251(80.19)	7(2.24)	313(100.00)

SD=Standard deviation

Table 4.3.2 3: Age-wise classification of height-for-age

	Height-for-age				
Age group	Severe stunting (<-3SD)	Stunting (-3SD≤ to <-2SD)	Normal (-2SD≤ to ≤ 3SD	Tallness (3SD<)	Total
5-9	0(0.00)	2(6.45)	26(83.87)	3(9.68)	31(100.00)
10-14	4(3.74)	6(5.61)	97(90.65)	0(0.00)	107(100.00)
15-19	7(4.00)	36(20.57)	128(73.14)	4(2.29)	175(100.00)
Total	11(3.51)	44(14.06)	251(80.19)	7(2.24)	313(100.00)

SD=Standard deviation

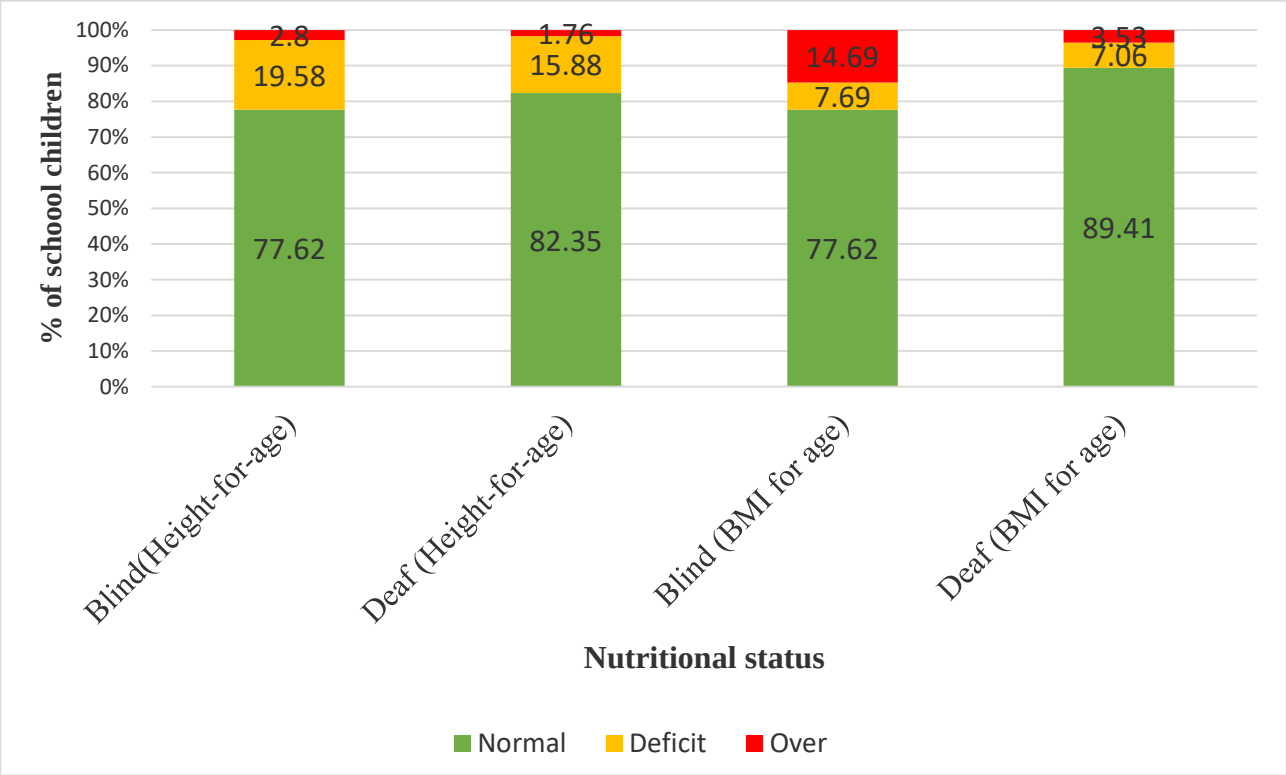

Figure 6: Nutritional status of Blind and Deaf children and adolescents

4.4 SOCIO-DEMOGRAPHIC CHARACTERISTICS AND HEALTH VARIABLES ASSOCIATION WITH BMI-FOR-AGE (THINNESS)

Table 4.4.1 shows sociodemographic characteristics association with BMI-for-age. The variables that were found to be significantly associated with students' BMI-for-age were the age of students (p=0.029), sex (p=0.035), class of the students (p=0.001), disability type (p=0.002), and school of the student (p=0.009). Religion, place of residence, parents alive, family setting, cause of disability, household size, ethnicity, mother and father education and occupation were not significantly associated with BMI-for-age.

Table 4.4.2 shows health-related variables association with BMI-for-age. Trimmed fingernails (p=0.005) and the number of times of illness of respondents within the past 6months (p=0.049)

were significantly associated with students' BMI-for-age. However, cause of disability, hand washing after the use of the latrine, neatness of clothing/uniform, and body bath were not significantly associated with BMI-for-age.

Table 4.4.3 shows single and multiple logistic regression analysis of independent variables associated with the outcome variable (BMI-for-age). Deaf students had a a significant association with BMI-for-age (AOR=0.481, p=0.030). Students within age groups 10-14years (AOR=0.351, p=0.040) and 15-19years (0.309, p=0.019) had significant association with BMI-for-age. Practiced of trimming fingernails at sometimes (AOR=4.222, p=0.022) and most times (5.647, p=0.005) had a significant association with BMI-for-age. Socio-demographic variables such as place of residence, household size, mothers' educational status, and fathers' educational status although not significant in this research were controlled for in the multiple logistic regression model to determine adjusted odds ratios.

Table 4.4 1: Association between socio-demographic characteristics and BMI-for-age

Variable	Thinness (N=23) N (%)	Normal (N=263) N (%)	Overweight/ Obese (N=27) N (%)	Total (N=313) N (%)	p-value
Age (years)					
5-9	0(0.00)	24(77.42)	7(22.58)	31(100.00)	**0.029***
10-14	9(8.41)	88(82.24)	10(9.35)	107(100.00)	
15-19	14(8.00)	151(86.29)	10(5.71)	175(100.00)	
Type of Disability					
Blind	11(7.69)	111(77.62)	21(14.69)	143(100.00)	**0.002**
Deaf	12(7.06)	152(89.41)	6(3.53)	170(100.00)	
Family Head					
Father	20(8.33)	204(85.00)	16(6.67)	240(100.00)	0.159*
Mother	3(5.17)	46(79.31)	9(15.52)	58(100.00)	
Other	0(0.00)	13(86.67)	2(13.33)	15(100.00)	
Student class					
Kindergarten/Foundation	0(0.00)	5(45.45)	6(54.55)	11(100.00)	**0.001***
Primary (1-3)	11(11.70)	72(76.60)	11(11.70)	94(100.00)	
Primary (4-6)	8(7.41)	96(88.89)	4(3.70)	108(100.00)	
JHS (1-4)	4(4.71)	76(89.41)	5(5.88)	85(100.00)	
Vocational	0(0.00)	14(93.33)	1(6.67)	15(100.00)	
Household Size					
1-4	6(5.45)	91(82.73)	13(11.82)	110(100.00)	0.332*
5-9	17(8.90)	162(84.82)	12(6.28)	191(100.00)	
10-14	0(0.00)	9(81.82)	2(18.18)	11(100.00)	
15-20	0(0.00)	1(100.00)	0(0.00)	1(100.00)	
Ethnicity					
Akan	13(9.35)	118(84.89)	8(5.76)	139(100.00)	0.675*
Krobo	2(7.14)	22(78.57)	4(14.29)	28(100.00)	
Ewe	4(5.48)	60(82.19)	9(12.33)	73(100.000	
Ga	3(6.98)	37(86.67)	3(6.98)	43(100.00)	
Others	1(3.33)	26(86.67)	3(10.00)	30(100.00)	
Parents alive					
Father only alive	3(15.79)	15(78.95)	1(5.26)	19(100.00)	0.765*
Mother only alive	2(4.35)	40(86.96)	4(8.70)	46(100.00)	
Both alive	18(7.53)	200(83.68)	21(8.79)	239(100.00)	
None alive	0(0.00)	8(88.89)	1(11.11)	9(100.00)	
Mother's occupation					
Trader	16(8.65)	156(84.32)	13(7.03)	185(100.00)	0.742*
Farmer	2(4.65)	35(81.40)	6(13.95)	43(100.00)	
Government worker	1(5.88)	14(8.35)	2(11.76)	17(100.00)	
Unemployed	0(0.00)	9(90.00)	1(10.00)	10(100.00)	
Others	1(2.70)	33(89.19)	3(8.11)	37(100.00)	

* Fisher's exact p-value, Thinness (<-2SD), Normal (-2SD≤ to ≤ 1SD), Overweight/Obese (1SD<)

Table 4.4.1: Association between socio-demographic characteristics and BMI-for-age cont'd

Variable	Thinness (N=23) N (%)	Normal (N=263) (%)	Overweight/ Obese(N=27) N (%)	Total (N=313) N (%)	p-value
Religion					
Christianity	20(7.52)	222(83.46)	24(9.02)	266(100.00)	1.000*
Islam	3(7.50)	34(85.00)	3(7.500	40(100.00)	
Traditional	0(0.00)	4(100.00)	0(0.00)	4(100.00)	
Others	0(0.00)	3(100.00)	0(0.00)	3(100.00)	
Family setting					
Monogamous	19(8.44)	190(84.440	16(7.11)	225(100.00)	0.178
Polygamous	4(4.55)	73(82.95)	11(12.50)	88(100.00)	
Residence					
Rural	13(8.61)	130(86.09)	8(5.30)	151(100.00)	0.104
Urban	10(6.17)	133(82.100	19(11.73)	162(100.00)	
Sex					
Male	18(10.98)	133(81.10)	13(7.93)	164(100.00)	**0.035**
Female	5(3.36)	130(87.25)	14(9.40)	149(100.00)	
Mother's education					
No formal education	5(9.80)	43(84.31)	3(5.88)	51(100.00)	0.431*
Primary	2(6.25)	29(90.63)	1(3.13)	32(100.00)	
JHS/Middle school	7(7.95)	70(79.55)	11(12.50)	88(100.00)	
SHS/Vocational/Technical	2(3.28)	55(90.16)	4(6.56)	61(100.00)	
Tertiary	2(5.26)	34(89.47)	2(5.26)	38(100.00)	
Don't know	1(5.00)	15(75.00)	4(20.00)	20(100.00)	
Father's education					
No formal education	4(12.50)	26(81.25)	2(6.25)	32(100.00)	0.586*
Primary	0(0.00)	16(94.12)	1(5.88)	17(100.00)	
JHS/Middle school	9(9.78)	77(83.70)	6(6.52)	92(100.00)	
SHS/Vocational/Technical	5(7.35)	58(85.29)	5(7.35)	68(100.00)	
Tertiary	2(4.17)	43(89.58)	3(6.25)	48(100.00)	
Don't know	1(5.56)	13(72.22)	4(22.22)	18(100.00)	
Father's occupation					
Trader	3(6.25)	43(89.58)	2(4.17)	48(100.00)	0.552*
Farmer	10(12.05)	64(77.11)	9(10.84)	83(100.00)	
Government worker	0(0.00)	33(91.67)	3(8.33)	36(100.00)	
Mechanic	1(8.33)	10(83.33)	1(8.33)	12(100.00)	
Driver	1(3.33)	28(93.33)	1(3.33)	30(100.00)	
Shoemaker	0(0.00)	6(100.00)	0(0.00)	6(100.00)	
Other	5(8.77)	47(82.46)	5(8.77)	57(100.00)	
Name of School					
Kibi School for the Deaf	8(8.99)	78(87.64)	3(3.37)	89(100.00)	**0.009**
Akropong Sch. for the Blind	11(7.69)	111(77.62)	21(14.69)	143(100.00)	
Koforidua Sch. for the Deaf	4(4.94)	74(91.36)	3(3.70)	81(100.00)	

* Fisher's exact p-value, Thinness (<-2SD), Normal (-2SD≤ to ≤ 1SD), Overweight/Obese (1SD<)

Table 4.4 2: Association between health-related variables and BMI-for-age

Variable	Thinness (N=23) N (%)	Normal (N=263) N (%)	Overweight/ Obese(N=27) N (%)	Total (N=313) N (%)	p-value
Hand washing after use of latrine					
Not practiced	1(3.23)	27(87.10)	3(9.68)	31(100.00)	0.349*
Sometimes practiced	13(11.40)	93(81.58)	8(7.02)	114(100.00)	
Most practiced	9(5.36)	143(85.12)	16(9.52)	168(100.00)	
Trimmed fingernails					
Not practiced	7(28.00)	17(68.00)	1(4.00)	25(100.00)	**0.005***
Sometimes practiced	10(7.46)	114(85.07)	10(7.46)	134(100.00)	
Most practiced	6(3.90)	132(85.07)	16(10.39)	154(100.00)	
Body bath					
Not practiced	3(15.79)	15(78.95)	1(5.26)	19(100.00)	0.153*
Sometimes practiced	2(2.35)	76(89.41)	7(8.24)	85(100.00)	
Most practiced	18(8.61)	172(82.30)	19(9.09)	209(100.00)	
Neatness of clothing/uniform	1(3.70)	25(92.59)	1(3.70)	27(100.00)	0.782*
Not practiced	9(8.18)	93(84.55)	8(7.27)	110(100.00)	
Sometimes practiced	13(7.39)	145(82.39)	18(10.23)	176(100.00)	
Most practiced					
Frequency of illness within past 6months					
0	2(2.78)	58(80.56)	12(16.67)	72(100.00)	**0.049***
1-3	15(7.81)	165(85.94)	12(6.25)	192(100.00)	
4-6	412.50)	25(78.13)	3(9.38)	32(100.00)	
7-10	2(11.76)	15(88.24)	0(0.00)	17(100.00)	
Cause of disability					
Congenital	7(6.67)	90(85.71)	8(7.62)	105(100.00)	0.610*
Illness	11(7.64)	119(82.64)	14(9.72)	144(100.00)	
Accident	4(6.78)	51(86.44)	4(6.78)	59(100.00)	
Others	1(20.00)	3(60.00)	1(20.00)	5(100.00)	

* Fisher's exact p-value, Thinness (<-2SD), Normal (-2SD≤ to ≤ 1SD), Overweight/Obese (1SD<)

Table 4.4 3: Crude and adjusted odds ratios of variables associated with BMI-for-age

Variable	COR	p-value	AOR	p-value	Variables controlled for
Type of disability					
Deaf	0.472	0.021	0.481	0.030	Age, sex & household size
Blind	1		1		
Age (years)					
10-14	0.269	0.009	0.351	0.040	Sex, household size, type of disability & place of residence
15-19	0.212	0.001	0.309	0.019	
5-9	1				
Sex					
Female	0.533	0.048	0.485	0.209	Age, household size, type & of disability
Male	1		1		
School of student					
Koforidua School for the Deaf	1.357	0.467	1.323	0.521	Student class, age group, Sex, type of disability & place of residence
Akropong School for the Blind	2.455	0.019	1.926	0.134	
Kibi School for the Deaf	1		1		
Trimmed fingernails					
Sometimes practiced	4.625	0.004	4.222	0.022	Age, sex, mother education, father education, school of student, place of residence & disability type
Most practiced	7.442	<0.001	5.647	0.005	
Not practiced	1		1		
Frequency of illness (with past 6months)					
1-3	0.344	0.005	0.573	0.232	Age, sex, mother education, father education, school of student, place of residence & disability type
4-6	0.304	0.048	0.503	0.356	
7-10	0.174	0.014	0.291	0.132	
0	1		1		
Student class					
KG/Foundational	15.717	<0.001	8.260	0.014	Age, sex, household size & disability type
Primary 4-6	0.762	0.503	1.035	0.940	
JHS 1-4	1.091	0.840	2.088	0.178	
Vocational	1.598	0.537	2.153	0.367	
Primary 1-3	1				

COR= Crude Odds Ratios, AOR= Adjusted Odds Ratios

4.5 SOCIO-DEMOGRAPHIC CHARACTERISTICS, AND NUTRITION AND HEALTH VARIABLES ASSOCIATION WITH HEIGHT-FOR-AGE (STUNTING)

Table 4.5.1 shows sociodemographic characteristics association with height-for-age. Height-for-age was significantly associated with the age of students (p=<0.001) and fathers' educational status (p=0.047). Type of disability, sex, religion, place of residence, student class, family setting, and the family head was not associated with height-for-age.

Table 4.4.2 shows nutrition and health-related variables association with height-for-age. Hand washing after use of the latrine, trimmed fingernails, neatness of clothing/uniform, body bath, and frequency of illness of the students within the past 6months was not significantly associated with height-for-age (stunting).

Table 4.5.2 shows single and multiple logistic regression analysis of independent variables associated with the outcome variable (height-for-age). Students within the age group 15-19years had a significant association with height-for-age (AOR=0.121 and p=0.001). Socio-demographic variables such as sex, place of residence, household size, and type of disability although not significant in this research were controlled for in the multiple logistic regression model to determine adjusted odds ratios.

Table 4.5.1: Association between socio-demographic characteristics and height-for-age

Variable	Stunting (N=55) N (%)	Normal (N=251) N (%)	Tallness (N=7) N (%)	Total (N=313) N (%)	p-value
Age (years)					
5-9	2(6.45)	26(83.87)	3(9.68)	31(100.00)	**<0.001***
10-14	10(9.35)	97(90.65)	0(0.00)	107(100.00)	
15-19	43(24.57)	128(73.14)	4(2.29)	175(100.00)	
Type of Disability					
Blind	28(19.58)	111(77.62)	4(2.80)	143(100.00	0.546*
Deaf	27(15.88)	140(82.35)	3(1.76)	170(100.00)	
Family Head					
Father	42(17.50)	193(80.42)	5(2.08)	240(100.00)	0.149*
Mother	7(12.07)	49(84.48)	2(3.45)	58(100.00)	
Other	6(40.00)	9(60.00)	0(0.00)	15(100.00)	
Student class					
Kindergarten/Foundation	2(18.18)	7(63.64)	2(18.18)	11(100.00)	0.258*
Primary (1-3)	15(15.96)	78(82.98)	1(1.06)	94(100.00)	
Primary (4-6)	21(19.44)	85(78.70)	2(1.85)	108(100.00)	
JHS (1-4)	13(15.29)	70(82.35)	2(2.35)	85(100.00)	
Vocational	4(26.67)	11(73.33)	0(0.00)	15(100.00)	
Household Size					
1-4	23(20.91)	83(75.45)	4(3.64)	110(100.00)	0.438*
5-9	29(15.18)	159(83.25)	3(1.57)	191(100.00)	
10-14	3(27.27)	8(72.73)	0(0.00)	11(100.00)	
15-20	0(0.00)	1(100.00)	0(0.00)	1(100.00)	
Ethnicity					
Akan	21(15.11)	116(83.45)	2(1.44)	139(100.00)	0.431*
Krobo	7(25.00)	20(71.43)	1(3.57)	28(100.00)	
Ewe	12(16.44)	57(78.08)	4(5.48)	73(100.00)	
Ga	10(23.26)	33(76.74)	0(0.00)	43(100.00)	
Others	5(16.67)	25(83.33)	0(0.00)	30(100.00)	
Parents alive					
Father only alive	5(26.32)	13(68.42)	1(5.26)	19(100.00)	0.120*
Mother only alive	8(17.39)	36(78.26)	2(4.35)	46(100.00)	
Both alive	38(15.90)	197(82.43)	4(1.67)	239(100.00)	
None alive	4(44.44)	5(55.56)	0(0.00)	9(100.00)	
Name of school					
Kibi School for the Deaf	17(19.10)	69(77.53)	3(3.37)	89(100.00)	0.266*
Akropong School for the Blind	10(12.35)	71(87.65)	0(0.00)	81(100.00)	
Koforidua School for the Deaf	28(19.58)	111(77.62)	4(2.80)	143(100.00)	

* Fisher's exact p-value, Stunting (<-2SD), Normal (-2SD≤ to ≤ 3SD), Tallness (3SD<)

Table 4.5.1: Association between socio-demographic characteristics and height-for-age cont'd

Variable	Stunting (N=55) N (%)	Normal (N=251) N (%)	Tallness (N=7) N (%)	Total (N=313) N (%)	p-value
Religion					
Christianity	47(17.67)	212(79.70)	7(2.63)	266(100.00)	0.696*
Islam	6(15.00)	34(85.00)	0(0.00	40(100.00)	
Traditional	1(25.00)	3(75.00)	0(0.00)	4(100.00)	
Others	1(33.33)	2(66.67)	0(0.00)	3(100.00)	
Family setting					
Monogamous	42(18.67)	179(79.56)	4(1.78)	225(100.00)	0.471*
Polygamous	13(14.77)	72(81.82)	3(3.41)	88(100.00)	
Residence					
Rural	25(16.56)	122(80.79)	4(2.65)	151(100.00)	0.810*
Urban	30(18.52)	129(79.63)	3(1.850	162(100.00)	
Sex					
Male	34(20.73)	126(76.83)	4(2.44)	164(100.00)	0.285*
Female	21(14.09)	125(83.89)	3(2.01)	149(100.00)	
Mother's education					
No formal education	10(19.61)	40(78.43)	1(1.96)	51(100.00)	0.321*
Primary	8(25.00)	24(75.00)	0(0.00)	32(100.00)	
JHS/Middle school	19(21.59)	67(76.14)	2(2.27)	88(100.00)	
SHS/Vocational/Technical	7(11.48)	51(83.61)	3(4.92)	61(100.00)	
Tertiary	4(10.53)	34(89.47)	0(0.00)	38(100.00)	
Don't know	1(5.00)	18(90.00)	1(5.00)	20(100.00)	
Father's education					
No formal education	6(18.75)	26(81.25)	0(0.00)	32(100.00)	**0.047***
Primary	0(0.00)	16(94.12)	1(5.88)	17(100.00)	
JHS/Middle school	24(26.09)	66(71.74)	2(2.17)	92(100.00)	
SHS/Vocational/Technical	12(17.65)	55(80.88)	1(1.47)	68(100.00)	
Tertiary	5(10.42)	43(89.58)	0(0.00)	48(100.00)	
Don't know	1(5.56)	16(88.89)	1(5.56)	18(100.00)	
Father's occupation					
Trader	12(25.00)	35(72.92)	1(2.08)	48(100.00)	0.371*
Farmer	16(19.28)	63(75.90)	4(4.82)	83(100.00)	
Government worker	6(16.67)	30(83.33)	0(0.00)	36(100.00)	
Mechanic	3(25.00)	9(75.00)	0(0.00)	12(100.00)	
Driver	3(10.00)	27(90.00)	0(0.00)	30(100.00)	
Shoemaker	0(0.00)	6(100.00)	0(0.00)	6(100.00)	
Other	6(10.53)	51(89.47)	0(0.00)	57(100.00)	

* Fisher's exact p-value, Stunting (<-2SD), Normal (-2SD≤ to ≤ 3SD), Tallness (3SD<)

Table 4.5 2: Association between health-related variables and height-for-age

Variable	Stunting (N=55) N (%)	Normal (N=251) N (%)	Tallness (N=7) N (%)	Total (N=313) N (%)	p-value
Hand washing after use of latrine					
No Practiced	2(6.45)	27(87.10)	2(6.45)	31(100.00)	0.060*
Sometimes practiced	22(19.30)	88(77.19)	4(3.51)	114(100.00)	
Most Practiced	31(18.45)	136(80.95)	1(0.60)	168(100.00)	
Trimmed fingernails					
No Practiced	7(28.00)	17(68.00)	1(4.00)	25(100.00)	0.278*
Sometimes practiced	19(14.18)	113(84.33)	2(1.49)	134(100.00)	
Most Practiced	29(18.83)	121(78.57)	4(2.60)	154(100.00)	
Body bath					
No Practiced	3(15.79)	15(78.95)	1(5.26)	19(100.00)	0.750*
Sometimes practiced	16(18.82)	67(78.95)	2(2.35)	85(100.00)	
Most Practiced	36(17.22)	169(80.86)	4(1.91)	209(100.00)	
The neatness of clothing/uniform					
No Practiced	4(14.81)	23(85.19)	0(0.00)	27(100.00)	0.727*
Sometimes practiced	19(17.27)	90(81.82)	1(0.91)	110(100.00)	
Most Practiced	32(18.18)	138(78.41)	6(3.41)	176(100.00)	
Frequency of illness (with past 6months)					
0	10(13.89)	60(83.33)	2(2.78)	72(100.00)	0.648*
1-3	38(19.78)	150(78.13)	4(2.08)	192(100.000	
4-6	4(12.50)	28(87.50)	0(0.00)	32(100.00)	
7-10	3(17.65)	13(76.47)	1(5.88)	17(100.00)	
Cause of disability					
Congenital	16(15.24)	87(82.86)	2(1.90)	105(100.00)	0.595*
Illness	28(18.44)	114(79.17)	2(1.39)	144(100.00)	
Accident	11(18.64)	45(76.27)	3(5.08)	59(100.00)	
Others	0(0.00)	5(100.00)	0(0.00)	5(100.00)	

* Fisher's exact p-value, Stunting (<-2SD), Normal (-2SD≤ to ≤ 3SD), Tallness (3SD<)

Table 4.5 3: Crude and adjusted odds ratios of variables associated with height-for-age

Variable	COR	p-value	AOR	p-value	Variables controlled for
Age (years)					
10-14	0.327	0.092	0.290	0.064	Sex, household size, type of disability & place of residence
15-19	0.140	0.002	0.121	0.001	
5-9	1		1		
Father's education					
Primary	8.893	0.023	10.787	0.015	
JHS/Middle school	0.730	0.526	1.050	0.926	
SHS/Vocational/Technical	1.156	0.787	1.503	0.460	Age, Sex, & type of disability
Tertiary	1.780	0.338	2.467	0.145	
Don't know	4.862	0.095	3.739	0.181	
No formal education	1				

COR= Crude Odds Ratios, AOR= Adjusted Odds Ratios

CHAPTER FIVE

5.0 DISCUSSION

5.1 NUTRITIONAL STATUS OF BLIND AND DEAF SCHOOL CHILDREN

The aim of the study was to assess the nutritional status (BMI-for-age and height-for-age) of blind and deaf school children and adolescents (5-19years) in three selected schools in the Eastern Region of Ghana. The present study reported the prevalence of stunting among the blind and deaf students (5-15years) as 5.8% and 5.6% respectively. This study was lower than a similar study in Iran with 17.7% and 36.3% prevalence of stunting among the blind and deaf (5-15years) respectively (Nachvak *et al*., 2016). Deaf students (10-19years) had 4.2% and 9.7% of prevalence rate of thinness and stunting respectively. This was lower than a study in India which reported deaf adolescents (10-19years) with thinness and stunting of 66.3% and 35.6% respectively (Kuruvilla & Hanjra, 2016). The present study reported 7.1% of thinness among deaf children and adolescents (5-19years). A study in India reported a 24.4% prevalence of thinness among children and adolescents (5-19years) with hearing impairment (Parvez *et al*., 2016).

The study showed higher overweight/obesity among blind students (14.7%) as compared to deaf students (3.5%). This was similar to a study in Saudi Arabia with higher obesity among blind (20.3%) than deaf (6.5%) (Abolfotouh, 2014). The higher obesity among the blind than the deaf may be due to the low level of physical activity of the blind as compared to the deaf. The prevalence of overweight/obesity (3.5%) among the deaf (5-19years) in this study was lower

than a study in the United States with the prevalence of overweight/obesity of 28% among deaf children and adolescents (2-20years) (Stough *et al*., 2016). This may be attributed to differences in age, dietary intake, and socioeconomic differences.

This study highlights the double burden of malnutrition experience among the disabled (Fitzpatrick *et al*., 2005). Undernutrition and overnutrition were both high among disabled students. The blind students had a higher double burden of malnutrition (stunting (19.6%), thinness (7.7%) and overweight/obesity (14.7%) as compared to the deaf students (stunting (15.9%), thinness (7.1%) and overweight/obesity (3.5%). The disabled are more vulnerable to the drivers and determinants of the double burden of malnutrition (WHO, 2016). The difference in physical activity and unmet need of care or support during feeding could account for the difference in thinness, stunting and overweight/obese prevalence rates of the deaf and blind students (Abolfotouh, 2014; Penagini *et al*., 2015).

5.2 SOCIO-DEMOGRAPHIC CHARACTERISTIC ASSOCIATION WITH NUTRITIONAL STATUS

The study sought to find out the association of socio-demographic characteristic on the nutritional status of blind and deaf school children and adolescents. This study found the age of students as significantly associated with nutritional status (BMI-for-age). Age of child association with nutritional status is similar to other studies in Ethiopia and India (Joshi *et al*., 2016; Melaku *et al*., 2015). The study did not find a significant association between household size, family setting, place of residence and parent education and occupation with the nutritional status of the school children and adolescents. This was contrary to studies in Palestine and China which showed a significant association between place of residence, family size and nutritional status (Mikki *et al*., 2009; Shi *et al*., 2005). Studies in India, Cameroon, and Ethiopia

also showed an association of nutrition status with the sex of children, mother's educational status, socioeconomic status and family settings (Dapi *et a*l., 2009; Joshi *et al*., 2016; Melaku *et al*., 2015). Similar studies on nutritional of children and adolescents in Kenya showed a significant association of age of mother, income and mother education with the nutritional status (Omondi & Kirabira, 2016). The difference in the association of socio-demographic characteristics with nutritional status could be due to the involvement of children without disabilities in some of the studies.

The present study assessed the personal hygienic practices of the students. It was observed that trimmed fingernails were significantly associated with BMI-for-age (thinness) but not height-for-age (stunting). Studies have shown that availability of household toilet facility, pipe water and observation of personal hygienic practices by children reduce the risk of infection and stunting (Cumming & Cairncross, 2016; Rah *et al*., 2015). The present study also showed that the frequency of illness of the students (within the past 6months) was not significantly associated with BMI-for-age (thinness) and height-for-age (stunting). This was contrary to other studies in which morbidity was shown to influence dietary intake, increase nutrient demand, losses and mal-absorption, and increased predisposition to malnutrition (Almeida *et al*., 2015; Brown, 2003; Ferdous *et al*., 2013). Almeida *et al*. (2015) showed that malaria was associated with impairment of nutritional status of children. Other studies showed that an increase in the frequency of diarrhoea was associated with poor weight gain or growth failure (Brown, 2003; Ferdous *et al*., 2013). Improvements in sanitation and safe water decreased diarrhoeal Disability-Adjusted Life Year (DALYs) whiles reductions in childhood undernutrition decreased diarrhoeal DALYs (Troeger *et al*., 2017).

5.3 ASSOCIATION OF DISABILITY TYPE AND NUTRITIONAL STATUS

The study sought to determine the association of type of disability (blind and deaf) and nutritional status. It was observed that the type of disability was significantly associated with BMI- for-age but not significantly associated with height-for-age. The study confirmed the hypothesis that there was a significant association between disability type and nutritional status (BMI-for-age). Single and multiple logistic regression analysis carried out showed that blind students had poorer nutrition status as compared to deaf students. This was similar to a study in India which showed varied nutritional status among children and adolescents (6-15years) with disabilities of Blindness, Deafness, Down's syndrome, and Autism (Hussein, 2018). A study also showed higher overweight and obesity among the blind than the deaf (Abolfotouh, 2014). The deaf had high physical activity as compared to the blind (Nachvak *et al*., 2016). This difference in physical activity level could also attribute the differences in nutritional status. The poorer nutritional status of the blind could be due to their higher unmet need of care or support compared with the deaf. Most disabled-associated wasting was usually connected with feeding problems (Penagini *et al*., 2015). A study in India showed that the relative risk of malnourished was significantly higher among disabled children with feeding difficulties than disabled children without feeding difficulty (Yousafzai *et al*., 2003).

5.4: LIMITATIONS OF THE STUDY

The study did not include children and adolescents with disabilities not attending school. This makes a generalization of the findings difficult. The study could not fully control multiple disabilities such as mental retardation which could also influence the findings. Parents of the

children were not interviewed, therefore validation of the responses was carried out by teachers who might not have full knowledge of their students. The nutritional status assessment was limited only to anthropometric measurements. Biochemical, dietary and clinical assessments were not included in the study.

5.5: STRENGTH OF THE STUDY

Despite the limitations above, the study used a pretested structured questionnaire with well-trained interviewers who were class teachers of the students. Anthropometric measures of height and weight were taken twice and average recorded by a well-trained nutritionist.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1: CONCLUSION

The study found that the blind students had a prevalence of thinness and stunting of 7.7% and 19.6% respectively, whiles the deaf students had thinness and stunting of 7.1% and 15.9% respectively. The blind students within the age group 10-19year had higher malnutrition rate (thinness and overweight/obese) as compared to the deaf students. Age of the students, type of disability (blind and deaf) and hygienic practice of trimming fingernails were significantly associated with BMI-for-age (thinness) but not with height-for-age (stunting).

6.2: RECOMMENDATIONS

The parents/caregivers and teachers of disabled children and adolescents should be educated on how to improve on their nutritional status. Further studies should employ biochemical, dietary and clinical assessments of the nutritional status of all types of disabilities targeting those in and outside of school.

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APPENDICES

APPENDIX 1: INFORMED CONSENT

UNIVERSITY OF GHANA Official Use only

Protocol number

COLLEGE OF BASIC AND APPLIED SCIENCES Ethics Committee for Basic and Applied Sciences (ECBAS)

PROTOCOL CONSENT FORM

Section A- BACKGROUND INFORMATION

Title of Study:	Assessment of the nutritional status of blind and deaf school children and adolescents in the Eastern Region of Ghana
Principal Investigator:	Apungu Francis Kwotua
Number of certified protocol:	ECBAS 012/17-18

Section B– CONSENT TO PARTICIPATE IN RESEARCH

General Information about Research

I am a student at the University of Ghana, School of Public Health, and I am conducting research in the Eastern Region to assess the nutritional status of blind and deaf school children and adolescents. The study procedure would involve measuring the height and weight of children and adolescents. The study would take 45 minutes to complete.

Benefits of the study

Information from this study would be used to provide a recommendation to authorities that would improve adequate nutrition and health of the children.

Risk of the study

There are no risks involve in taking part in this study except for the time to be spent which would be minimized by well-trained field staff.

Confidentiality

Confidentiality would be protected and the identity of informants maintained anonymously. All data collected will be kept in the possession of the principal researcher on a daily basis. Thus, by signing or thumb printing a written consent form, the participant or their representative is authorizing the confidentially of data collected.

Compensation

A pen and pencil would be given to students who opt in for the study, however, all students would benefit from education on nutrition even if they opt out.

Withdrawal from Study

Participation in this study is voluntary and participants may withdraw at any time without any penalty. The participant would not also be affected if he/she declines to participate or later stops participating. The participant's legal representative will beinformed in a timely manner if information becomes available that may be relevant to the participant's willingness to continue participation or withdraw.

Contact for Additional Information

If you have any problem or question about this study you can contact the investigator (Apungu Francis Kwotua) through mobile number 0245804626.

If you have any issues about your rights as a participant you can contact the address below:

Administrator, Ethics Committee for Basic and Applied Sciences

College of Basic and Applied Sciences

University of Ghana

P. O. Box LG 68

Legon – Accra

Tel: + 233 277493259

Email: ekacquaah@ug.edu.gh

Section C- VOLUNTEER AGREEMENT

"I have read r have had someone read all of the above, asked questions, received answers regarding participation in this study, and I am willing to give consent for me, my child/ward to participate in this study. I have not waived any of my rights by signing this consent form. Upon signing this consent form, I will receive a copy for my personal records."

_____

Volunteer's Name

_____ _____

Mark of volunteer or Signature Date

If volunteers cannot read the form themselves, a witness must sign here:

I was present while the risk, benefits, and procedures were read to the volunteer. The volunteer has agreed to take part in the research and all questions were answered.

_____

Witness Name

_____ _____

Witness Signature Date

I certify that the potential benefits, nature, purpose and possible risks associated with participating in this research have been explained.

_____

Person who Consented Name

_____ _____

Person who Consented Signature Date

APPENDIX 2: CONSENT FORM FOR PARENTS/GUARDIAN

UNIVERSITY OF GHANA

DEPARTMENT OF POPULATION, FAMILY AND REPRODUCTIVE HEALTH

SCHOOL OF PUBLIC HEALTH COLLEGE

19/12/2017

Dear Parent/Guardian,

CONSENT FORM FOR PARENTS/GUARDIAN

I, (Apungu Francis Kwotua) am a student at the University of Ghana studying Masters of Public Health at the School of Public Health. I am conducting a study to assess the nutritional status of blind and deaf school children and adolescents in the Eastern Region of Ghana. Information from this study would be used to provide a recommendation to authorities that would improve adequate nutrition and health of the children and adolescents.

Your child is invited to participate in this research being conducted. The study procedure would involve measuring the weight and height of the child. The study would take 45minutes and the time to be spent on the research would be minimized by well-trained field staff. There are no risks involve in taking part in this study. Participation in this study is voluntary. The participant would not also be affected if he/she declines to participate or later stops participating. A pen and pencil would be given to students who opt in for the study, however, all students would benefit from education on nutrition even if they opt out.

All information that would be collected would be treated as confidential. All data collected will be kept in the possession of the principal researcher on a daily basis. Thus, by signing or thumb printing a written consent form, the participant or their representative is authorizing the confidentially of data collected.

If you have any problem or question about this study, you can contact the Student Researcher. (Apungu Francis Kwotua through mobile number 0245804626.

Declaration by parent/guardian

I have read this consent form and know that I may ask questions now and at any time. I have also be given a copy of the consent form for my records. I consent for my child to participate in the research described above.

Name of the child: …….

Signed/Thumbprint: …….

(Parent/Guardian of child/participant) Date……

Name of witness…….

Signature/Thumbprint of witness…… Date……

Apungu Francis Kwotua

(Student Researcher)

Signature……

Date……...

APPENDIX 3: ASCENT FORM FOR CHILDREN AND ADOLESCENTS

UNIVERSITY OF GHANA

DEPARTMENT OF POPULATION, FAMILY AND REPRODUCTIVE HEALTH

SCHOOL OF PUBLIC HEALTH COLLEGE

ASCENT FORM FOR CHILDREN

I, (Apungu Francis Kwotua) am a student at the University of Ghana studying Masters of Public Health at the School of Public Health. I am conducting a study to assess the nutritional status of blind and deaf school children and adolescents in the Eastern Region of Ghana. Information from this study would be used to provide a recommendation to authorities that would improve adequate nutrition and health of children and adolescents.

I wish to invite you to participate in this study. The study procedure would involve measuring your weight and height. The study would take 45minutes and the time to be spent on the research would be minimized by well-trained field staff. There are no risks involve in taking part in this study.

Participation in this study is voluntary. The participant would not also be affected if he/she declines to participate or later stops participating. A pen and pencil would be given to students who opt in for the study, however, you would benefit from education on nutrition even if you opt out.

All information that would be collected would be treated as confidential. If you have any problem or question about this study, you can contact the Principal investigator. (Apungu Francis Kwotua through mobile number 0245804626.

Declaration by child

I have read this ascent form, understood and asked all questions for clarification regarding this study. I, therefore, agree willing to participate.

Child's name: ……..

Date of interview: ……

Signed/Thumbprint: …….

Apungu Francis Kwotua

(Student Researcher)

Signature…….

Date…….

APPENDIX 4: QUESTIONNAIRE

Participant ID | | |

UNIVERSITY OF GHANA

SCHOOL OF PUBLIC

HEALTH COLLEGE OF

HEALTH SCIENCES

Questionnaire for assessing the nutritional status of blind and deaf school children and adolescents (5-19years) in the Eastern Region of Ghana

IDENTIFICATION

i. Date of interview (DD/MM/YYYY) intedat | | | - | | | - | | | | |

ii. Name of interviewer……,,…… | |

initials iii. Name of School 1. Kibi School for the Deaf 2. Koforidua School for the Deaf | |

3. Akropong Sch. for the Blind Schname

iv. Class of student…… 1. Primary 1-3. 2. Primary 4-6 3. JHS 1-4

4. Vocational 5. KG/Foundational Stuclas | |

SECTION A: SOCIO-DEMOGRAPHIC CHARACTERISTICS

1. Type of disability I=Blind 2=Deaf typdis | |

2. Sex of Respondent 1=Male 2= Female sexresp | |

3. Date of birth (dd/mm/yyyy) Age (yrs)……. datbith | | | - | | | - | | | | |

4. The religion of respondent 1=Christian 2=Moslem 3=Traditionalist 4=others (specify)…….. religion

5. Which ethnic group do you belong? 1=Akan 2=Krobo ethnic
   3=Ewe 4=Ga 5=others (specify)…….)

6. What is the place of residence of respondent outside school? (specify)…….
   1=rural area 2 =urban area placrsd

7. State which of your respondents' parent is alive? palive
   1. Father alive only 2. Mother alive only 3. Both alive 4. None alive

8. What is your fathers' occupation? 1=trader 2=Farmer fatoccup
   3=Government worker 4=mechanic 5=Driver 6=Shoemaker 7= others (specify)……

9. What is your mothers' occupation? 1=trader 2=Farmer motocu
   3=Government worker 4=unemployed 5 =others (specify)…….)

10. What is the educational level of your father? 1=No formal education 2=Primary school
    3= JHS/Middle school 4=SHS/Technical/Vocational 5=tertiary motedu

11. What is the educational level of your mother? 1=No formal education 2=Primary school
    3= JHS/Middle school 4=SHS/Technical/Vocational 5=tertiary fateduc

12. Family setting 1=monogamous 2=Polygamous fmlyset

13. How many individuals are in a household? ……. hhsize

14. Who is the head of the household? 1=Father 2=mother
    3= others (specify)……. headh

SECTION B: WATER, SANITATION, AND HYGIENE

14. What are the sources of drinking water of the respondent at home? ***(Accept multiple responses)*** 1=Pipe-borne water/bore-hole 2=Well 3=River/Stream 4=Sachet/Bottle 5= others (specific)…… watsour

15. How often do you do the following hygienic practices?

INDICATOR	**Score 0** **For no practice**	**Score 1** **For sometimes practice**	**Score 2** **For mostly practiced.**
Hand washing practices before a meal			
Hand washing practices after use of latrine			
Trimmed fingernails			
Neatness of clothing			
Use of detergent to wash hands			
The frequency of body bath.			
TOTAL SCORE			

Total for no practice (score 0) …….. rank sc0

Total for some time practice (score 1) …….. rank sc1

Total for mostly practiced (score 2) …….. rank sc2

SECTION C: HEALTH STATUS OF RESPONDENTS

17. How many times did you fall sick within the past 6months (AUGUST 2017 to JANUARY 2018)? .....times numsick

18. If one or more in Q17, select the disease conditions below which the child had?

1=Diarrhea 2=malaria 3=common cold 4=cough ***(Accept multiple responses)***

5=skin infection 6=others (specify) ---------- discond

19. What is the cause of respondent disability?

1=Congenital/ by birth 2= illness 3=Accident/Injuries

4=Others (Specify)…….. causdis

SECTION D: ANTHROPOMETRY OF CHILDREN AND ADOLESCENTS

20. Kindly measure the weight, height twice and record

	1st Reading	**2nd Reading**	**Average**
Weight (kg)			
Height (cm)			

APPENDIX 5: ETHICAL APPROVAL LETTER

UNIVERSITY OF GHANA
ETHICS COMMITTEE FOR BASIC AND APPLIED SCIENCES (ECBAS)
P. O. Box LG 1195, Legon, Accra, Ghana

Ref. No: ECBAS 012/17-18

9th January, 2018.

Mr, Francis Apungu Kwotua
School of Public Health
University of Ghana
Legon, Accra.

Dear Mr. Apungu Kwotua,

ECBAS 012/17-18: ASSESSEMENT OF NUTRITIONAL STATUS OF SCHOOL CHILDREN WITH DISABILITIES IN THE EASTERN REGION OF GHANA

This is to inform you that the above reference study has been presented to the Ethics Committee for Basic and Applied Sciences for a full board review and the following actions taken subject to the conditions and explanation provided below:

Expiry Date:	8/01/19
On Agenda for:	Initial Submission
Date of Submission:	10/10/2017
ECBAS Action:	Approved
Reporting:	Bi-Annual

Please accept my congratulations.

Yours sincerely,

Professor Daniel Bruce Sarpong
ECBAS Chairperson

ETHICS COMMITTEE FOR BASIC AND APPLIED SCIENCES
APPROVED
09 JAN 2018
UNIVERSITY OF GHANA

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